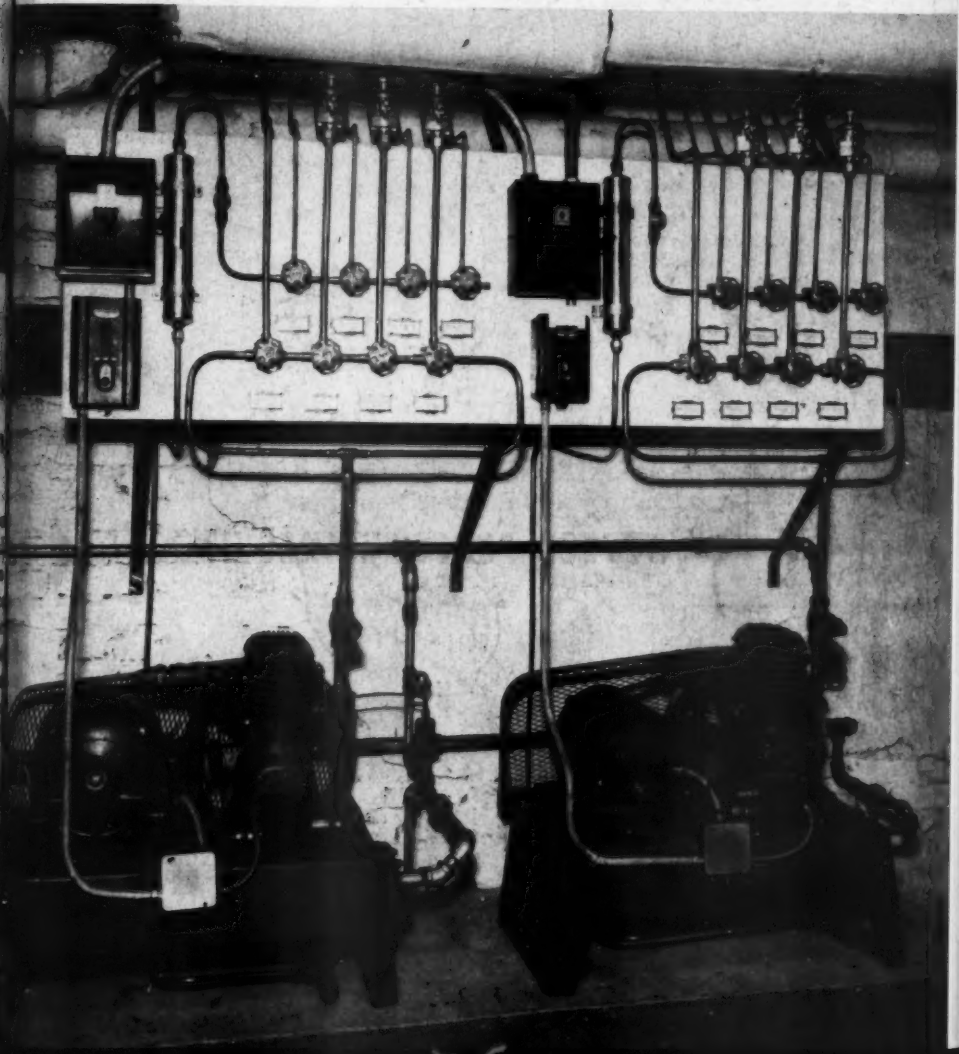
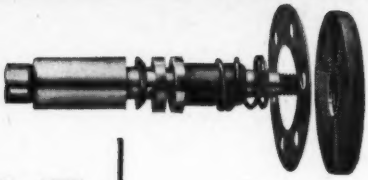
Refrigeration Service Engineer

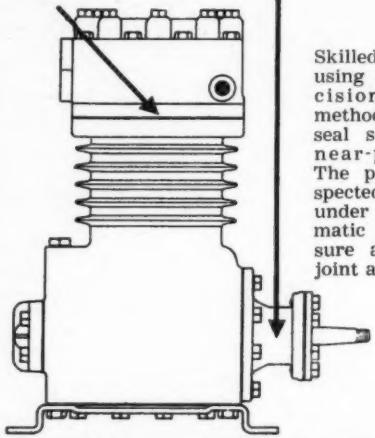
VOL. 15 NO. 11 ★ ★ ★ NOVEMBER · 1947



Modernization Pays



The high quality found in all CHICAGO valve plates is the result of accurate machining and careful testing. All sizes are designed for exact replacement on 340 models from the small domestic to 5 H.P. compressors. Replaceable seats are exclusively a feature of all CHICAGO valve plates.



Skilled workmen using modern precision lapping methods finish the seal surfaces to near-perfection. The parts are inspected for flatness under a monochromatic light, to assure a gas-tight joint at all times.

CHICAGO valve plates and seals give trouble-free service. Increase the compressor efficiency —modernize your customer's equipment.

FOR BETTER PERFORMANCE USE

CHICAGO VALVE PLATES

SOLD THROUGH LEADING

PERFECT BALANCE

Chicago Seals
MODERN DESIGN

CHICAGO SEALS

REFRIGERATION WHOLESALERS

CHICAGO SEAL CO. 20 N. WACKER DR., CHICAGO 6, ILL.

THE REFRIGERATION SERVICE ENGINEER, Nickerson & Collins Co., Publishers, 435 N. Waller Ave., Chicago 44, Ill. Published monthly, Vol. 15, No. 11, November, 1947. Entered as second class matter March 4, 1938, Chicago, Ill., under the Act of March 3, 1879. Subscription in the United States, $3.00 per year; all other countries, $4.00 per year.

KNOW YOUR REFRIGERANT

CORROSION LIMITS

EFFECTS OF MOISTURE

Moisture in a refrigerating system may cause any or all of the following:

1. Freezing up at expansion valve or capillary tube, ice in the evaporators.
2. Corrosion of metals to form sludge.
3. Copper Plating.

RESULTS OF TESTS CONDUCTED ON STEEL

Refrigerant	% Water by Weight	Results
Sulfur Dioxide	0.03	Slight discoloration
	0.10	Slight scale
	0.15	Heavy scale
		Presence of air did not affect results
Methyl Chloride	0.02	Slight discoloration
	0.03	Marked discoloration
		Very slight scale
	0.05	Moderate to heavy scale
		Presence of air increased corrosion in all cases
"Freon-12"		Similar to methyl chloride

FACTS REVEALED

1. Corrosion of metals occurs whenever the amount of water present exceeds fairly well defined limits.
2. Water reacts with sulfur dioxide, methyl chloride, "Freon-12" and other refrigerants to form acids.
3. These acids react with steel, copper, and aluminum parts of a refrigerating system to form definite metallic salts (sludges).
4. In a sulfur dioxide system the amount of moisture tolerable is higher than in a methyl chloride or "Freon-12" system but corrosion, once begun, proceeds more rapidly in a sulfur dioxide system.
5. Corrosion in a butane or isobutane system is due to the direct action of the water and perhaps air, on metals.
6. Moisture tolerances are higher for copper, brass and aluminum than for steel.
7. Moisture tolerances are lower at higher temperatures found in condenser and compressor than at room temperature.
8. Corrosion is much worse in the presence of air in all refrigerants except sulfur dioxide.
9. Approximately 90% of the sludges produced in refrigerating systems are due to moisture; the others are associated with oil and minor causes.

LIQUID Sulfur Dioxide ANSUL® LIQUID Methyl Chloride ANSUL®

®REG. U.S. PAT. OFF.

SEND FOR THIS BULLETIN

An informative reprint, "MOISTURE and DRYING METHODS," will be sent on request. No obligation. Send for it today.

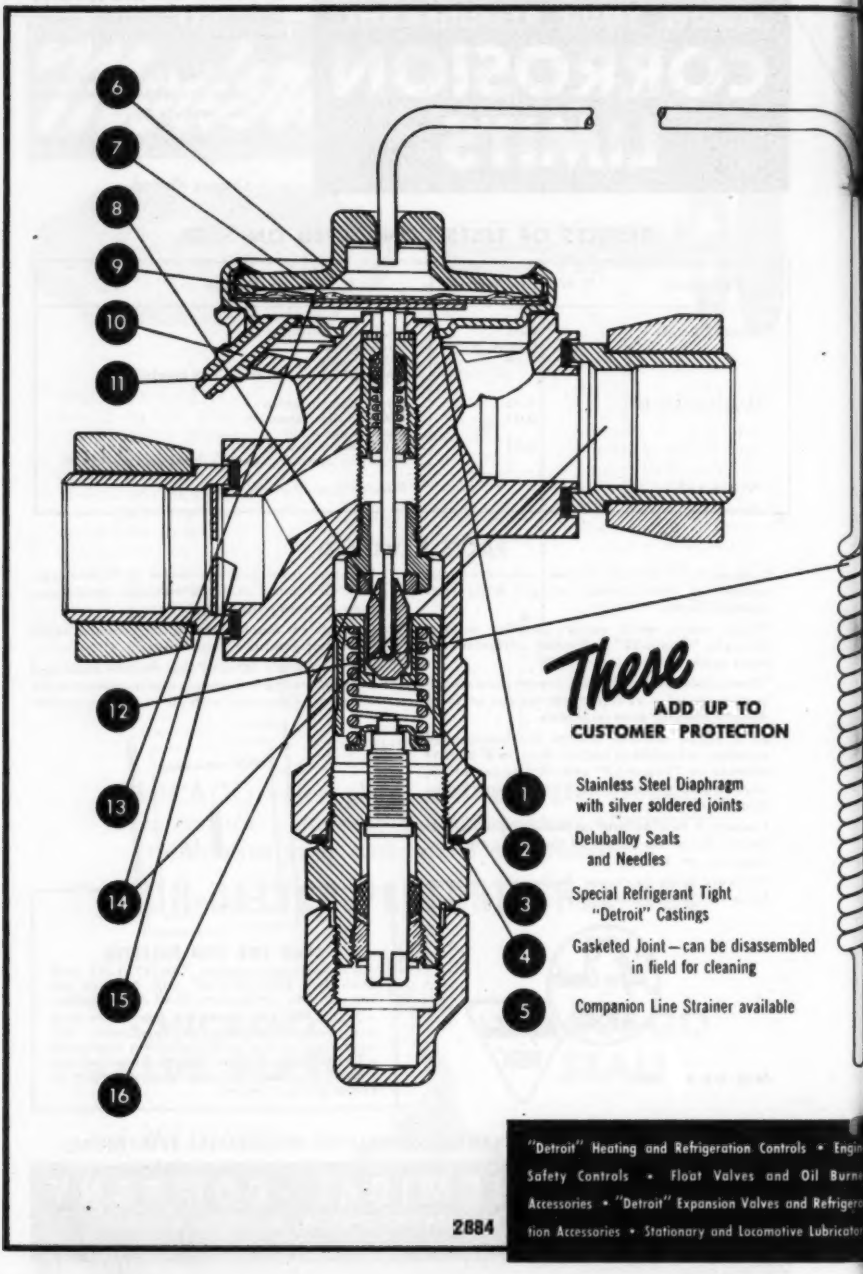
ANSUL WHOLESALERS are ready and equipped to render an intelligent, cooperative service to refrigeration engineers and maintenance men on problems which arise from time-to-time in the operation of refrigerating systems.

ANSUL REFRIGERANTS ARE AVAILABLE AT LEADING WHOLESALERS EVERYWHERE

ANSUL CHEMICAL COMPANY

REFRIGERATION DIVISION, MARINETTE, WISCONSIN

DISTRIBUTORS FOR KINETIC'S "FREON-11" "FREON-12" "FREON-21" "FREON-22" AND "FREON-113"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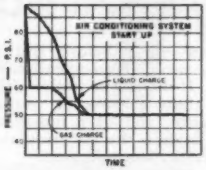
These
ADD UP TO
CUSTOMER PROTECTION
1 Stainless Steel Diaphragm with silver soldered joints
2 Deluballoy Seats and Needles
3 Special Refrigerant Tight "Detroit" Castings
4 Gasketed Joint—can be disassembled in field for cleaning
5 Companion Line Strainer available
"Detroit" Heating and Refrigeration Controls • Engi
Safety Controls • Float Valves and Oil Burn
Accessories • "Detroit" Expansion Valves and Refrigera
tion Accessories • Stationary and Locomotive Lubricato
2884

Let's Analyze Quality

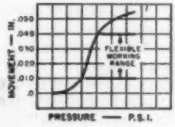
"DETROIT" 786-787-788-LARGE CAPACITY—HIGH TEMPERATURE ADJUSTABLE THERMOSTATIC EXPANSION VALVES . . . FOR AIR CONDITIONING AND COMMERCIAL INSTALLATIONS

These ADD UP TO PERFECT REFRIGERANT CONTROL

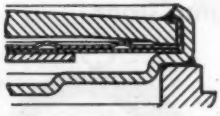
6 

Gas Charged for motor and system protection

7 Diaphragm Operating Range selected for flexibility



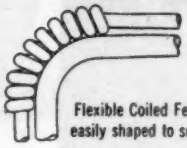
8 Swivel Type Needle—no rubbing—no wear

9 

Leaf Spring Action for smoother action and long life

10 External Equalizer Connections for multi-circuit application

11 Special Push Rod Packing with spring controlled friction

12 

Flexible Coiled Feeler Bulb easily shaped to suction line

These ADD UP TO FLEXIBILITY OF INSTALLATION

13 Gas Charged Power Elements for air conditioning and commercial temperatures

14 Standard Connections available Inlet and Outlet Sweat Connection for ⅜" OD to 1⅛" OD tube

15 Secondary Outlet Orifices for capacity variation and surge control

16 Standard Valves for 1.6 to 20 Tons Freon-12

899—1.6—3.—4.5—6 Tons Freon-12

786—3 to 6 Tons Freon-12

787—6 to 11 Tons Freon-12

788—12—16—20 Tons Freon-12

They all add up to the Famous Quality Obtainable only in "DETROIT" Valves

DETROIT LUBRICATOR COMPANY

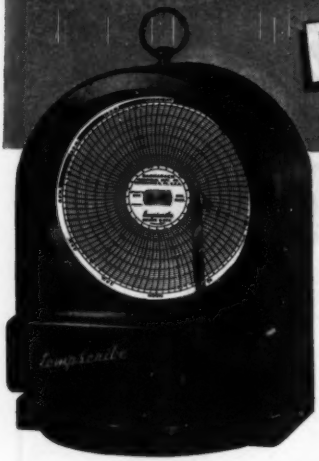
"DETROIT"

General Offices: 5900 TRUMBULL AVENUE, DETROIT 8, MICHIGAN

Division of American Radiator & Standard Sanitary Corporation

RECORDED

PROOF OF PERFORMANCE



TEMPERATURE RECORDER

Standard Ranges
24 Hour Chart Rotation

−20° to +40°F.
−10° to +50°F.
30° to 60°F.
40° to 100°F.
70° to 130°F.

TEMPSCRIBE Recorders have many applications of practical value to stimulate sales of new appliances, promote customers' good will, and build profitable service business.

TEMPSCRIBE Recorders do what indicating instruments can't do—they give a 24-hour record of temperature and motor on-and-off time. There is no waste of time watching thermometer readings or clocking motor operation. Just leave your TEMPSCRIBE Recorders on the job for a time while you handle some other work.

TEMPSCRIBE charts—made before and after servicing—are tangible proof of an installation or service job well done. If the charts indicate that a complaint is due to abnormal use or improper location of the appliance, you have indisputable evidence on hand to explain the situation to the housewife, storekeeper, or plant operator.

In the show room, TEMPSCRIBE charts convincingly prove that temperatures in freeze chest and storage space are maintained within the desired range even at high room temperature.

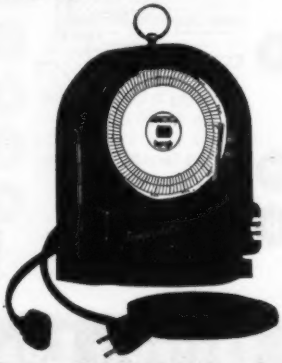
TEMPSCRIBE Recorders may be used on practically any household and commercial refrigeration unit, such as dual-temperature refrigerators, home and farm refrigerators, refrigerated display cases, reach-in freezers, walk-in coolers, ice cream cabinets, frozen food cabinets, and refrigerating equipment used in food freezing plants and locker plants.

Convertible to Motor Operation Recorder, or Different Temperature Range, Simply by Changing Door

Any TEMPSCRIBE can be quickly converted to a different temperature range, or to a time-operation recorder, by replacement of the door that forms the front of the recorder. Door removal simply requires lifting out the hinge pin.

The pen of the Operation Recorder is actuated by an electro-magnetic armature, made for either series connection (plug-in connections shown at right) or for parallel connection. Either type has voltage range up to 250 volts, amperage range up to 20 amperes.

For refrigeration shop and service work a widely used TEMPSCRIBE combination comprises one clock case with spring-wound clock for 24-hour chart rotation and two doors (one with −20° to +40°F. temperature element, and one with mechanism for recording motor on-and-off time).



RECORDER for MOTOR OPERATION

Ask your jobber about TEMPSCRIBE, or write for Bulletin 731

BACHARACH INDUSTRIAL INSTRUMENT CO.
7000 BENNETT STREET • PITTSBURGH 8, PA.

Again **ALCO** *pioneers!*

ALCO "732" SNAP-ACTION SUCTION VALVE

FOR USE ON:

DRINKING WATER COOLERS
BEVERAGE COOLERS
TWO-TEMPERATURE APPLICATIONS
SUCH AS:
DISPLAY CASES
VEGETABLE STORAGE
SODA FOUNTAINS
AND MANY OTHERS REQUIRING
ACCURATE TEMPERATURE CONTROL

- Complete control in one compact, economical device—directly responsive to actual load temperature.
- Easy-to-set adjustment dial (calibrated in 1° graduations) provides precise control from 20° to 50° F. Operates on only 2° differential.
- Automatic defrost on "off" cycle for load temperatures above freezing. Liquid charged—mount it anywhere.
- Direct temperature control—eliminates the inconvenience and expense of electrical connections—saves time and trouble. No accessories needed.

Available now at your wholesaler's. Ask for Bulletin 732.

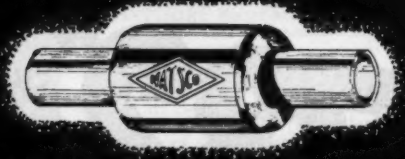
Thousands already in use!

ALCO VALVE CO.

857 KINGSLAND AVE. • ST. LOUIS 5, MO.

Designers and Manufacturers of Thermostatic Expansion Valves, Pressure Regulating Valves, Solenoid Valves, Float Valves, Float Switches.

Hard to get items!



"CHECK VALVES" with Solder Fittings

ORDER BY PART NUMBER

For Tubing Size O.D.	Part No.	
1/4"	C-2A	$2.45 each
5/16	C-2B	
3/8	C-2C	

FLAPPERS

F 1	WATSCO FLAPPER, for Westinghouse Unit	$.60 each
F 2	**WATSCO SUCTION FLAPPER, for Sealed Units listed below	.60 each
F 3	**WATSCO DISCHARGE FLAPPER, for Sealed Units listed below	.60 each
F 4	WATSCO DISCHARGE FLAPPER, for General Electric D. R. Models	.35 each
F 5	WATSCO FLAPPER, for Norge Sealed Units	.60 each
F 6	WATSCO FLAPPER, for Norge Rollator	.20 each
F 7	WATSCO FLAPPER, for Frigidaire Meter Miser	.35 each

SUCTION FLAPPER AND DISCHARGE FLAPPER MARKED ** FIT STEWART-WARNER, PHILCO, CHIEFTAN AND TECUMSEH UNITS

CONNECTING ROD FOR CROSLEY $1.40

VANES

V 1	WATSCO VANES, for Coldspot (set of 4) 1" x 1/2"	$1.00 set
V 2	WATSCO VANES, for Coldspot (set of 4) 1 1/4" x 1/2"	1.00 set
V 3	WATSCO VANES, for Coldspot (set of 4) 1 1/2" x 1/2"	1.00 set
V 4	WATSCO VANES, for Coldspot (set of 4) 1 1/2" x 3/16"	1.00 set
V 10	WATSCO VANES (TONGUE & HOLE), TYPE), for Norge Rollator	2.50 each
V 11	WATSCO VANES (TONGUE TYPE), for Norge Rollator	2.50 each
V 12	WATSCO VANES (GROOVED TYPE), for Norge Rollator	2.50 each

OTHER ITEMS NOW AVAILABLE. IF YOUR JOBBER CANNOT SUPPLY YOU, ORDER DIRECT.

SEND FOR OUR COMPLETE DESCRIPTIVE CIRCULAR AND PRICE LIST

WAGNER TOOL & SUPPLY CORP.

1300 - 43rd AVENUE, DEPT. RE, LONG ISLAND CITY, NEW YORK

REMOVES SCALE

QUICKLY...
EASILY...
THOROUGHLY...
ECONOMICALLY...

USE

NU-COIL

Condenser Coils
Unit Coolers
Spray Heads
Refrigeration Drains
Valve Plates
Control Valves
Stuck Compressors
Evaporator Fins
Water Coolers
Temperature Thermostats

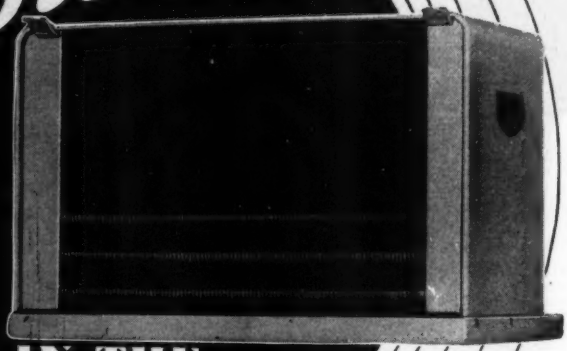
CLEAN coils, pipes, and drains with NU-COIL—keep them clear as a whistle . . . functioning like new! NU-COIL removes insulating deposits that increase head pressure and cause loss of operating efficiency. Scaled cooling tubes cleaned with NU-COIL perform with renewed operating efficiency . . . reduced operating costs.

NU-COIL is sufficiently mild for use on expensive light metals and precision fittings. NU-COIL is *easy to handle* . . . Requires no special handling equipment.

Available everywhere at the better Refrigeration Wholesale Supply Houses. Write today for FREE descriptive folder.

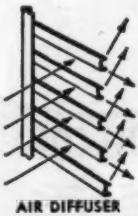
SKASOL CORPORATION
113 GLENCOE AVENUE · WEBSTER GROVES 19, MISSOURI

Foremost

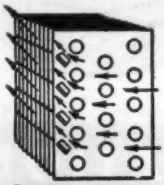


IN THE LOW SIDE FIELD

LIQUID DISTRIBUTOR



AIR DIFFUSER



BUILT-IN LOUVRES

Filterpure

Combines the most advanced features in Unit Cooler design. Exclusive Betz Coil construction—Patented, built-in Louvres—Patented Liquid distributor—Air Diffuser—Guaranteed Ratings—Heavy Duty Motors — Quiet — Streamlined—Rugged.

Filterpure is the choice of leading Refrigeration Wholesalers, dealers and users from coast to coast.

Sold by leading Refrigeration Wholesalers

BETZ CORPORATION

HAMMOND, INDIANA

FOR *Faster Service* AND MORE PROFITS

YOU NEED BOTH THESE HANDY KITS

Genuine

WAGNER

Fast Moving

Electric Motor

Repair Parts

New Lower Prices!

M-1—For "one-trip" jobs . . . as useful to the service man as his pliers and screwdriver, and almost as easy to carry.

The M-1 kit box is of heavy fiber, contains a variety of 61 of the motor repair parts most commonly needed for domestic appliance type motors up to and including ½ horsepower.

M-2—For your shop . . . a convenient and economical way to get wide coverage of repair parts.

The M-2 kit box is of sheet steel, contains a variety of more than 680 fast moving parts for domestic and industrial type repulsion-start induction brush-lifting and capacitor-start motors up to and including 3 horsepower.

M-1 and M-2 kits are available now at our 25 branches and 325 authorized service stations. Or if more convenient, order your kits by using the coupon below.

WAGNER ELECTRIC CORPORATION
6433 Plymouth Avenue, Saint Louis 14, Mo., U.S.A.

Date.....

Please ship .....(Quantity) Motor Parts Assortment M-1 ($9.00 net each) $.....
Shipping Weight 3 pounds

F. O. B. Point of Shipment.....(Quantity) Motor Parts Assortment M-2 ($144.00 net each) $.....
Shipping Weight 46 pounds

Order No.....

Total $.....

Company.....

Address.....

City.....Zone.....State.....

M47-21B

Wagner Electric

SPREAD THE SUPPLY OF *Artic*

Reg. U.S. Pat. Off.

DU PONT METHYL CHLORIDE

- 99.5% PURE, DRY, UNIFORM
- IN ALL STANDARD CONTAINERS
- COAST-TO-COAST DISTRIBUTION

E. I. du Pont de Nemours & Co. (Inc.),
Electrochemicals Dept., Wilmington 98, Delaware.

DU PONT FOR QUALITY

DU PONT METHYL CHLORIDE

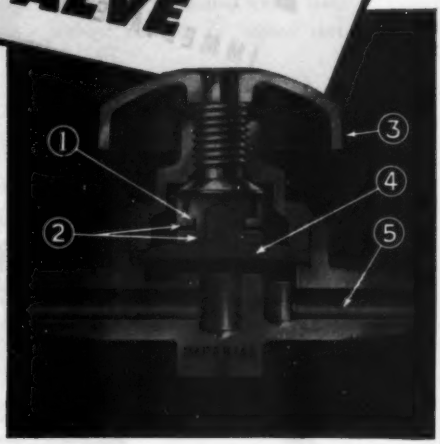
BETTER THINGS FOR BETTER LIVING THROUGH CHEMISTRY

DUPONT

LOW OVERALL HEIGHT

Means Neat, Compact Installations

IMPERIAL DIASEAL VALVE



NO SPRINGS • "EITHER-WAY" FLOW

Extremely low height — *another important point of superiority of DiaSeal Valves* — is a decided advantage where installations are made in aisles or close quarters.

They offer a minimum of protrusion. In fact, Imperial DiaSeal Valves — in sizes up to and including ⅝" O.D. — can be installed in a 4" conduit box with room to spare.

Other features that make the DiaSeal the outstanding valve for refrigeration service are readily apparent in the sectional view.

Ask for Bulletin 103-REF

See Your Jobber

1. NO SPRINGS —DiaSeal Valve cannot "stick shut" because diaphragm is lifted mechanically. Positive control with flow in either direction.

2. ONLY TWO MOVING PARTS — Simple construction assures greater dependability.

3. EASY FINGER-TIP ACTION — Quick, sure opening and closing with less than two turns of handle.

4. LONG LIFE DIAPHRAGM is impervious to all common refrigerants. In actual tests, has withstood over 1,000,000 openings and closings under refrigerant pressure.

5. INLET AND OUTLET PORTS IN LINE. Simplifies installation.

Furnished in 2-way and angle types, with either flare or solder connections. The Imperial Triple-Seal Groove is an added feature on flare connections ⅜" and larger.

THE IMPERIAL BRASS MFG. CO., 536 S. Racine Avenue, Chicago 7, Illinois

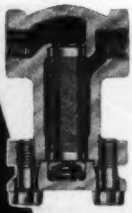
IMPERIAL

FITTINGS • VALVES • FILTERS • FLOATS • DEHYDRATORS • CHARGING LINES • TOOLS FOR CUTTING, FLARING, BENDING, PINCH-OFF AND SWEDGING

For Ammonia

IMMEDIATE DELIVERY ON MANY ITEMS

For more than a quarter century, the continued preference shown in the refrigeration and industrial fields for premium-grade Henry Valves, Fittings, and Accessories can be traced to the exclusive patented features of design and construction found in many of the Henry Products.



SCALE TRAP OR STRAINER
Large capacity with spring tensioned self-centering and removable screen. Choice of 50 or 100 mesh. Sizes ¼" to 2" inclusive.

GAUGE GLASS ASSEMBLY
For compressor crank cases and liquid storage tanks. Slotted gauge glass guards. Ball check valve in inlets automatically shuts off flow if the glass should break.

Screwed Bonnet Type Valve

LINE SHUT-OFF VALVE
More compact because the bodies are made from die cast permanent mold iron of close grain structure. Two piece stem construction. Floating disc has soft metal insert which rotates on stem. Sizes 1¼" to 2" inclusive.

SOLD BY JOBBERS EVERYWHERE

Cable:
HEVALCO
Chicago

Bolted Bonnet Type Valve

PRESSURE RELIEF VALVE
Accurate release and positive reseating action. Soft alloy metal seat and extended stem permit emergency reseating without removing valve from line. Sizes ⅜" to 2" inclusive.

HENRY VALVE COMPANY 3266 WEST GRAND AVE. CHICAGO 51, ILLINOIS

BLIZZARD OVER CHOMO-LUNGMA

Few have braved the finial precipice of Everest; none has returned to tell what he found at the crest. It may be that man will never conquer its awful cold, the fury of the sudden hurricanes which lash, without warning, the highest spot on earth.

Few indeed fancy the risk of this unpredictable weather. But many have use for the controlled climate of refrigeration . . . the calculated cold of refrigerated spaces which is efficiently, economically safeguarded by Jamison Cold Storage Doors. Jamison-built doors go back almost as far as the cold storage industry itself. Half a century of know-how explains the confidence that refrigeration, cold storage, and frozen food operators have in the Jamison name.

For cold storage doors expressly tailored to your needs, choose from the Jamison standard line . . . Jamison, Stevenson, Victor, and NoEqual Doors. Your installation deserves this long-term investment in quality. Full information . . . and address of nearest Jamison branch . . . may be obtained by writing Jamison Cold Storage Door Company, Hagerstown, Maryland.

JAMISON
COLD STORAGE DOORS

Branches in Principal Cities, Coast to Coast

"We are using nothing but Thawzone"

SAYS MR. MARKLEY

September 20, 1947

Highside Chemicals Company
195 Verona Avenue
Newark 4, New Jersey

Gentlemen:

During the past 6 years most of my time has been devoted to the designing and engineering of low temperature refrigeration equipment, from 4 cubic feet cabinets to locker plants. The stiffest problem was the prevention of moisture freezing up the expansion valve. When evaporative freezing up the expansion temperatures of minus 15 to minus 25 degrees fahrenheit are maintained, the least trace of moisture causes trouble with expansion valves.

We had used various types of drying agents, but found that even Silica-Gel was far from 100 per cent satisfactory. Often, we had to go back to the job several times to replace the drier before finally eliminating the moisture. Almost invariably, if a change of refrigerant had to be put in, additional driers were necessary. Finally, we spent a large amount of time and money developing capillary tubes to replace expansion valves.

Then we learned that quite a number of our dealers were using Thawzone and eliminating expansion valve freeze-ups. I am now with a company doing a large volume of commercial refrigeration business, probably 75 per cent of which is low temperature installations. We are using nothing but Thawzone in all our applications.

Very truly yours,

HODGE'S

Richard Markley, Jr.

Richard Markley, Jr.

ALSO MAKERS OF TRACE REFRIGERANT LEAK DETECTOR

HIGHSIDE CHEMICALS COMPANY

195 VERONA AVE., NEWARK 4, N. J.

THAWZONE
PATENTED
The PIONEER FLUID DEHYDRANT

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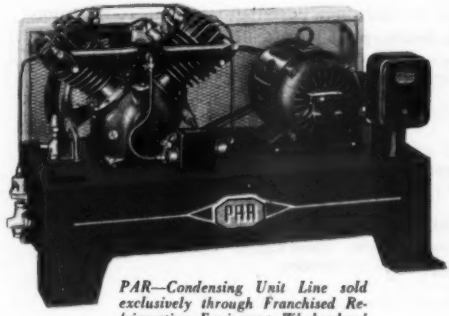

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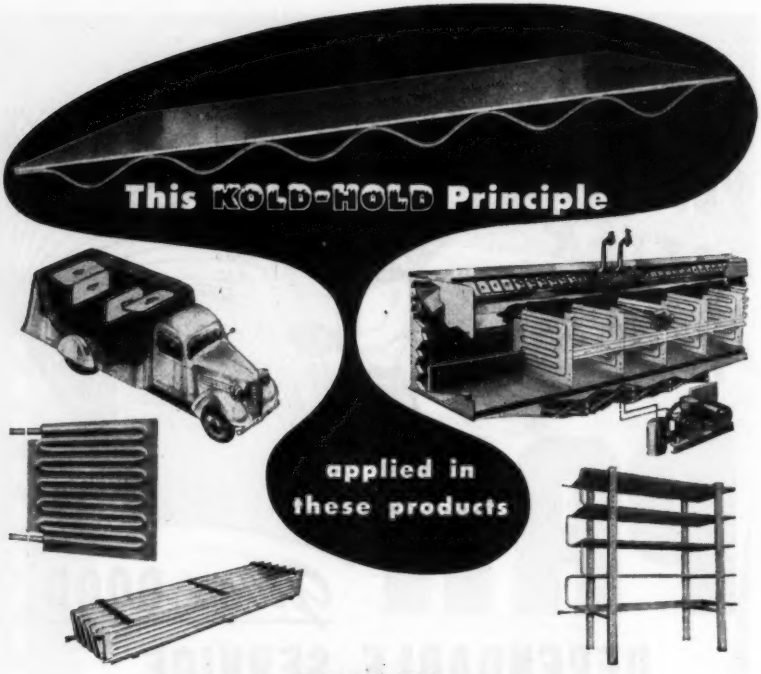

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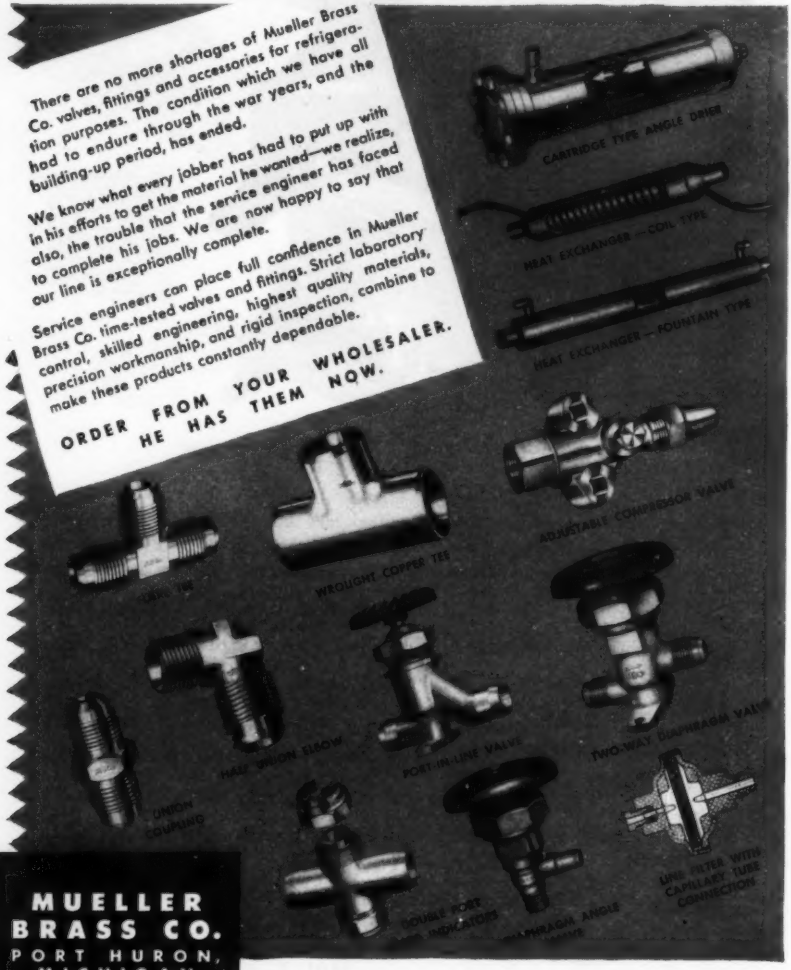

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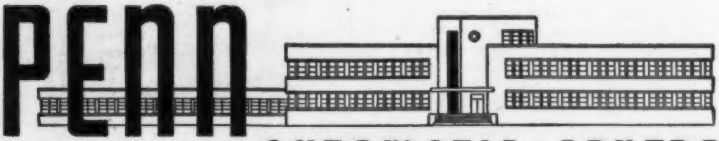

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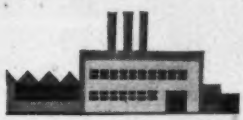

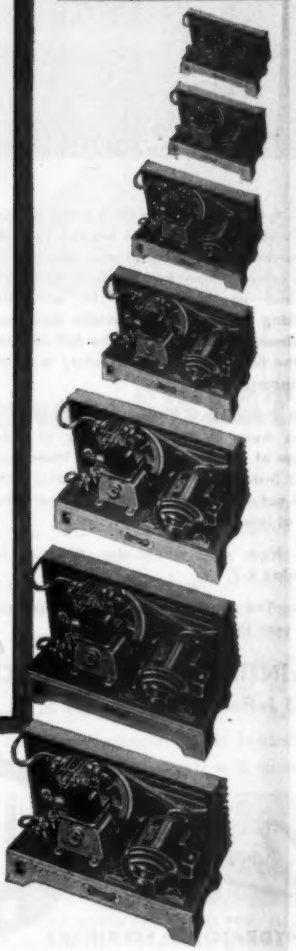

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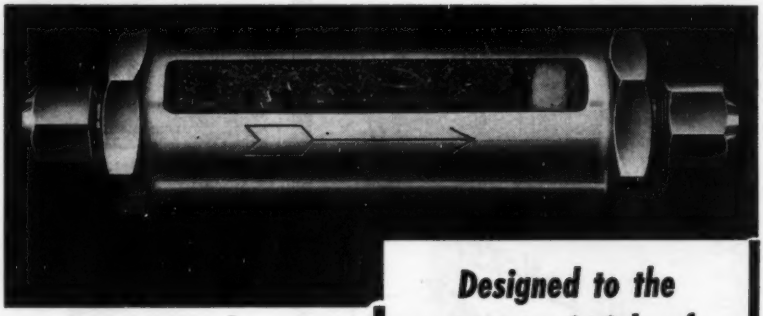

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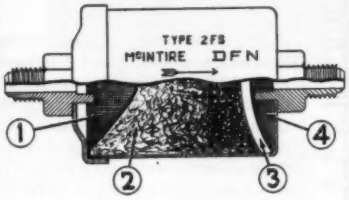

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Contents

In This Issue 27
Heat Effects in Driers—*by Dr. Walter O. Walker* 29
Special Equipment for Ice Skating Rinks —*by Edward Dowis* 33
Kold-Hold New Production Methods Improve Product .. 38
Take the Guess Out of Estimating —*by Donald F. Daly* 39
Specialties Build Volume—*by Herbert Hanley* 42
Construction and Operation of Admiral Dual-Temp Refrigerator 44
N.A.R.C. Reports 50
All-Industry Show Hours 50
The Heat Pump in the Chicago Area 51
Service Pointers:
Doping Threads of Fittings 54
Watch that Lock Screw 54
Repairing Broken Drill Bits 54
Starting a Nut 54
Demonstrating a Freezer 54
Bushing for Flare Block 55
Neutralizing SO_2 55
Questions and Answers:
Comments on Questions 58
Aerator Under-Powered 58
Analysis of Sludge 60
Mills Ice Cream Freezer 60
Electric Circuit Feeds Back 62
Building a Freezer 64
Buy from the Dealer Who Maintains Your Appliances —*by Bert Merrill* 66
RSES News and Activities:
Virginia State Association 68
Treasurer Doyle—Proud Pappy 68
Alabama State Holds Annual Meeting 70
Directors of RSES Meet to Plan Expanded Program 72
Buckeye Assn. Busy on International Convention Plans 74
Midland Empire, North Montana Chapters Hold Joint Meeting 74
Chicago Chapter Holds Town Hall Meeting 76
Chapter Notes 76
New and Improved Equipment 90
News of the Equipment Industry 96

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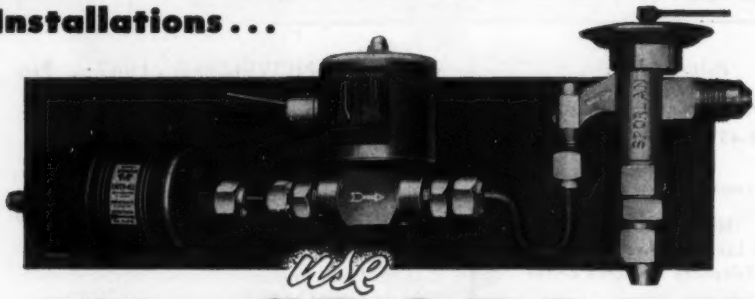
on all Commercial Refrigeration Installations . . .



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You can install Sporlan Products with Confidence

IN HIS many appearances before groups of Service Engineers, Dr. Walter O. Walker has repeatedly been asked the reason for driers heating during use. In answer to these questions, he directed some laboratory tests on the question and wrote the analysis appearing on page 29. It answers several questions on the subject.

"SPECIAL Equipment for Ice Skating Rinks" by Edward Dowis on page 33, is a discussion on the refrigeration and air conditioning requirements of skating rinks to maintain the several different temperature levels needed for efficient operation and for the comfort of spectators and skaters. The article is the second in a series on skating rinks.

DONALD F. DALY in his series "Take the Guess Out of Estimating" takes up the subject of contract flat rates for rebuilding domestic and small commercial units in quantity. His article appears on page 39.

HOW small specialties grow into a volume of business and help to level out the peaks and valleys in business is told in an article by Herbert Hanley on page 42.

THE second and final article on "Construction and Operation of Admiral Dual-Temp Refrigerators" appears on page 44. Test methods for the different parts of the system are included in this article.

A REPORTER'S report on "The Heat Pump in the Chicago Area," a subject discussed recently by two Chicago utility men, is contained on page 51. The article brings to the front the many variables and the several unknown factors involved in the estimation of this application, but at the same time endeavors to show its theoretical possibilities.

"BUY from the Dealer Who Maintains Your Equipment," might well become the slogan of the independent service group engaged in sales. Read, on page 66, how one sales and service company is using it in their advertising.

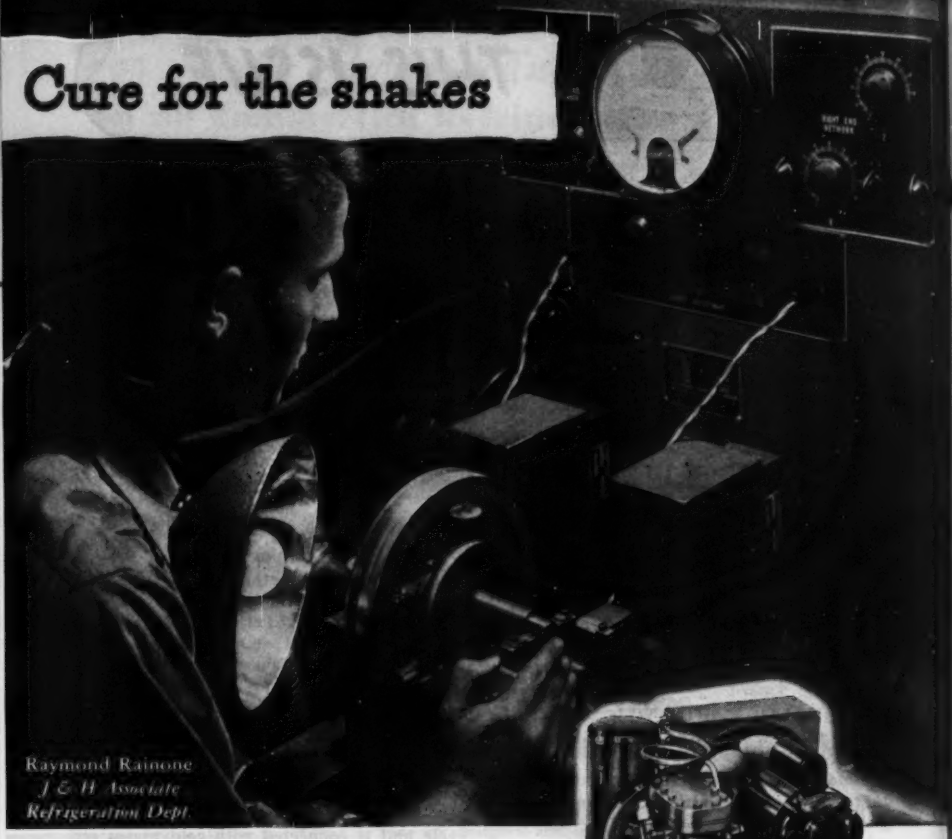
COVER

OUR front cover this month is a view of a recent installation made in a cafeteria by Elton Lewis Refrigeration Service, Omaha, Nebr. It is an unusually neat installation of two Baker condensing units, each of 2 hp. capacity charged with "Freon" refrigerant. The unit on the left operates on the defrosting cycle. Hand valves from left to right are two DX coils used for storage and the three remaining lines are sweet water bath coils for salad serving counters. The machine on the right operates on a frost cycle and is connected with cold plates set into the serving counters.

Hand valves from left to right are: 1—Two plates for desserts; 2—Three plates in series for salads; 3—Three plates in series for salads; 4—Two butter plates. The three-way packless hand valves making up the manifold are by Superior; the two-temperature valves and expansion valves are Automatic Products. Driers are made by Remco, heat exchangers by Kramer, liquid line sight glass by Mueller, and cold plates by Dole. There are two more units not shown in the picture. One of these is a 3 hp. unit for water cooling and a ⅓ hp. unit for cooling coffee cream.

Twenty-five hundred patrons are served between the hours of 11:30 a.m. and 2:30 p.m. The cafeteria has a seating capacity of 490. Fixtures in the cafeteria were supplied by Albert Pick Company of Chicago.

Cure for the shakes



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Heat Effects in Driers

Is A Drier Good When It Heats During Use?

By WALTER O. WALKER*

MANY service engineers have observed a marked heating effect when a refrigerant passes through a drier unit and some have taken this to mean that the drier is in excellent condition and therefore capable of removing moisture from the liquid or gas refrigerant. On the other hand, failure to detect heating of the drier unit has been interpreted in some instances to mean that the drier was not in good condition, that is, it was wet and therefore not only could not remove from, but might even add moisture to, the refrigerant.

There seems to be no doubt of the validity of the observation that a drier unit will heat up during use. The assumption that this was necessarily related to the removal of moisture was open to question. In order to determine the truth or falsity of this assumption the following tests were conducted involving the refrigerants, sulphur dioxide, methyl chloride, and "Freon 12" and the widely used driers, silica gel, activated alumina and Drierite. Wherever possible results are presented in the form of graphs so that certain semi-quantitative relations become apparent.

In order to study the heat effects occurring in a drier, a definite volume (approx. 500 cc.) of reactivated drier was placed (while still warm) in a flask insulated with expanded vermiculite contained in a one-half gallon Dewar flask. A thermometer, placed in the exact center of the drier mass

* Director of Research, Ansul Chemical Company.

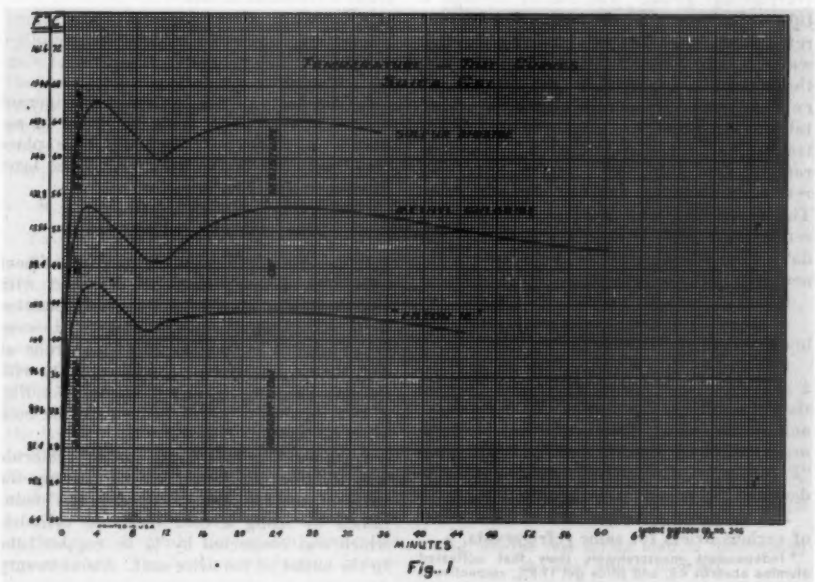


Fig. 1

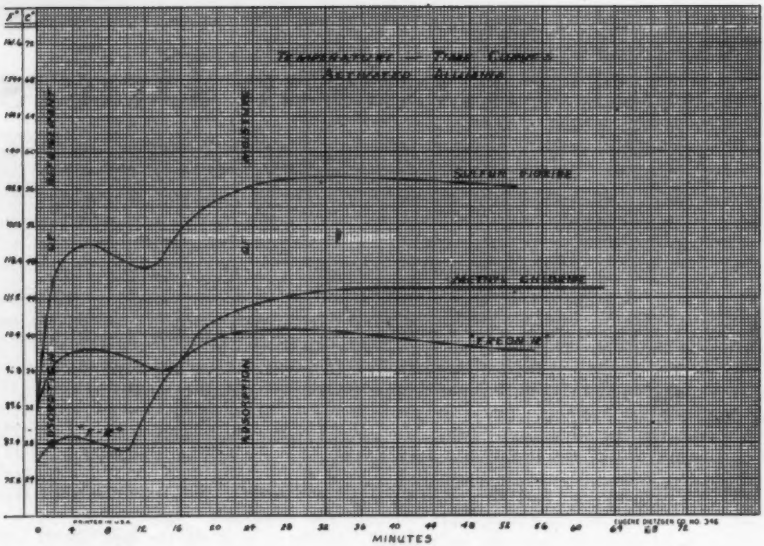


Fig. 2

was read at regular time intervals for the purpose of preparing temperature-time curves. The drier was allowed to cool before tests were started. Dry gaseous refrigerant (refrigerant grade) was led in through a tube at the bottom of the flask. Wet gaseous refrigerant, prepared by bubbling through water, was introduced into the flask through the same tube employed for the dry gaseous refrigerant. Temperature-time data were taken. The procedure employed was to introduce the dry refrigerant at a standard rate of flow until the temperature had reached a maximum and had begun to drop. The dry refrigerant was cut off, and wet refrigerant introduced. Temperature-time data were taken until the temperature remained relatively constant.

Results are shown in Figs. 1, 2, 3.

A study of these curves reveals the following important facts:

1. There is, with the exception of Drierite, a heat effect evidenced by the first peak in the curve, due to adsorption of the refrigerant by the drier.* This heat effect is of the order sulphur dioxide—methyl chloride—"Freon 12." Quantitative comparisons, while desirable, were not made at this time.

2. This gives a comparison of heat effect of various driers for same refrigerants.

* Independent measurements show that activated alumina absorbs 4.5, and silica gel 19.8%, respectively.

3. There is a heat effect directly due to the action of moisture on the drier. In the case of activated alumina and silica gel, heat is due to adsorption; with Drierite it is from a chemical action.

$$CaSO_4 + \tfrac{1}{2}\,H_2O \rightarrow CaSO_4 \cdot \tfrac{1}{2}\,H_2O$$

calcium sulfate
(Drierite)

4. The heats of absorption of refrigerant and moisture, while made to occur in sequence in these tests, actually take place simultaneously in the drier unit. See later discussion and Fig. 6.

Heat Effects in Drier Units

In order to determine the location of heat effects in a drier unit, one charged with silica gel was placed in a vertical position with the inlet downward and to it were taped five thermometers (No. 1 on tube at top, thence downward, 2, 3, 4 and 5), with the bulbs resting against the metal. See Fig. 4. The tape also served to insulate the bulb from the surrounding air.

Liquid refrigerant grade methyl chloride was admitted at the bottom by opening the valve of the cylinder. Flow rate was maintained by using a cold receiving cylinder, which was connected by ¼ in. copper tube to the outlet of the drier unit. About twenty

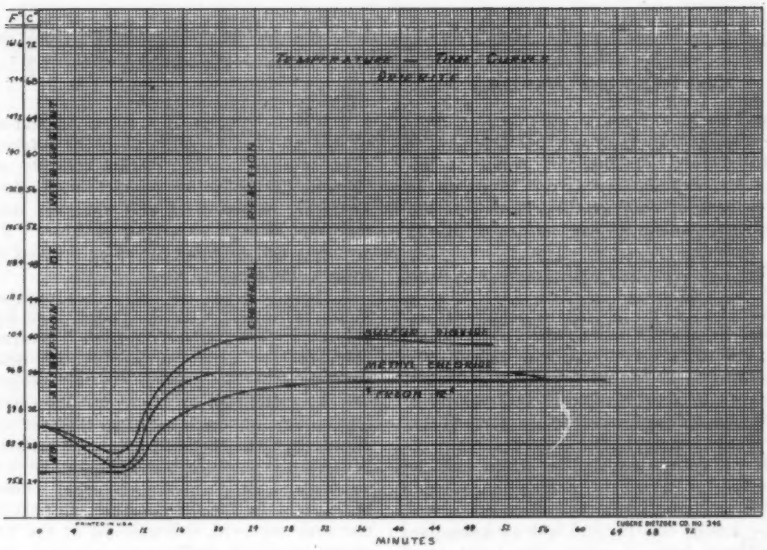


Fig. 3

minutes was required to pass approximately five pounds of refrigerant through the unit. Temperature-time readings were made for each thermometer. Data so derived, were used to construct the curves shown in Fig. 5. Immediately after the valve to the storage cylinder was opened the upper part of the unit became quite warm (in one test where the rate of entrance of methyl chloride was restricted, 50°C (122.0°F.) was reached), while the lower part, due to refrigerating effect, was cold. The center of the unit was slightly warm.

Refrigerating Effect Offsets Heat

Two heat effects occur in the unit, refrigeration and adsorption. The liquid refrigerant enters the bottom of the unit and evaporates while the gas so produced quickly passes upward through the silica gel. Adsorption liberates heat which is apparent in the middle and upper portions of the unit, while at the bottom it is more than neutralized by the refrigerating effect. However, the heat of adsorption is equivalent, to the heat of evaporation of the refrigerant, with the result that the temperature of the entire unit tends to revert to its starting temperature, as soon as the temperature effects (hot at the top and cold at the bottom) neutralize one another. The heat of adsorption is uni-

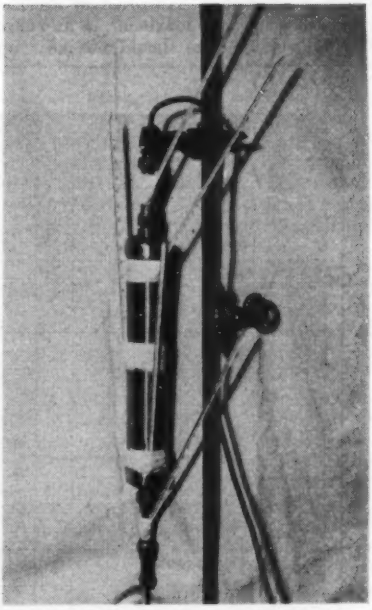


Fig. 4—The test set-up used in determining the heat effects in driers.

form throughout the entire length of the silica gel.

Heat Effect in a Wet Drier

In order to determine whether wet silica gel will heat up when methyl chloride gas is admitted to it, approx. 200 grams of this drier was exposed for several hours to an atmosphere of 80% relative humidity. 6% additional moisture was adsorbed during this period.

This wet silica gel was placed in a drier unit and refrigerant grade methyl chloride admitted as a gas, in order to eliminate any refrigerating effect due to liquid refrigerant. The wet silica gel became hot immediately on admission of methyl chloride gas despite the large amount of moisture adsorbed by it. Reference to the curves (Figs. 1, 2, 3) for "Freon 12," methyl chloride and sulphur dioxide indicates that similar action may be expected for "Freon 12" and sulphur dioxide with activated alumina and silica gel as well as for methyl chloride and activated alumina. Additional tests to prove this point seem unwarranted in view of the nature of the curves in Figs. 1, 2, 3. Since Drierite has no heat of adsorption, as proved by absence of an adsorption heat maximum in its curve (Fig. 3) wet Drierite should not heat up when dry refrigerant is admitted to it.

Conclusions

The foregoing tests prove:

1. Whether wet or dry, silica gel and activated alumina heat up when the refrigerants, sulphur dioxide, methyl chloride and "Freon 12" come in contact with them. ***Therefore, a hot drier unit does not mean that the drier is removing moisture. The heat test has no value for silica gel and activated alumina.***

2. Drierite heats up only when moisture comes in contact with it. There is no heat due to adsorption of refrigerant. Therefore, the heat test might indicate a good drier, but only if it was possible for the refrigerant to be admitted so slowly that the refrigerating effect is much less than the heat produced from the chemical action of moisture in Drierite. On checking on this point with a drier and 3.63 lb. methyl chloride containing 0.016% by weight moisture, no heat effect was observed. Calculations of the heat effects involved confirm this test and show that the refrigerating predominates over the chemical heat effect. ***Therefore, the heat test will not prove a Drierite filled drier unit good or bad since it will not heat up in either case.***

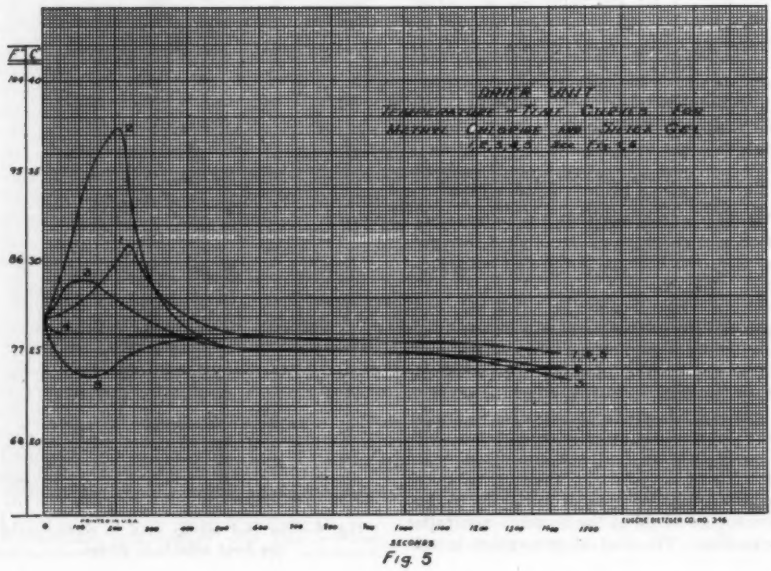


Fig. 5

Special Equipment for *Ice Skating Rinks*

By EDWARD DOWIS

MANY factors need to be considered in determining the amount and kind of equipment desirable in an ice skating rink, as well as the installation and operation of the entire system so as to achieve desired results economically. It should not be assumed that all the equipment described, will be found in every installation. Many large rinks operate successfully with a good refrigerating plant having cooling coils constructed as described in the preceding article, and a minimum of auxiliary equipment. In others, problems have arisen or been anticipated, with which the well informed refrigeration and air conditioning man should be familiar.

Following are some of the problems which may have to be solved:

1. Maintenance of several different temperatures to suit different kinds of occupancy within the same room.
2. Providing ice of desired quality for various forms of skating.
3. Use of the refrigerating plant for air conditioning during the summer season.
4. Prevention of fogging and sweating near the ice surface, impairing visibility and causing discomfort.
5. Elimination of soft spots or areas on the ice surface.
6. Removing ice quickly, to prepare floor for other uses.
7. Elimination of waste of power, fuel and labor.

Air Temperatures

Air temperature near the ice surface should be kept low, in order to prevent rapid transfer of heat from air to ice. This transfer increases with temperature difference, and the ice must be kept between 24 and 30 degrees, therefore, an air temperature above 40 F will add considerably to the ice refrigerating load and result in increased power cost and limited capacity. Unless the layer of air next to the ice is disturbed by the ventilating or heating system, the building and rink can be designed so that the coldest layer of air will lay next to the ice, and this may blanket the ice from the warmer air above. The cold air being relatively heavy tends to settle to the bottom, and being in contact with the ice, remains chilled. If necessary, cold air may be brought from outside when the temperature is suitable, or mixed with recirculated air and distributed through outlets near the ice surface. The primary object is to keep warm air from reaching the ice.

Second Article

The increasing application of refrigeration to ice making for entertainment and recreation presents new problems to the designer, operator, installer and service engineer. This article shows how these problems are being solved.

Active skaters prefer a temperature between 50 F and 60 F, preferably about 55 F. This may have to be obtained by heating, introduction of outside air or cooling, depending on the outside temperature. Hockey players may prefer a temperature considerably below 50 F, due to the large amount of heat they must dissipate, during strenuous exercise.

The number of people, both skaters and spectators, has much to do with the proper selection and operation of equipment. A person at rest will release about 225 Btu per hour of sensible heat and a skater as much as 500. This may vary with the rate of exertion. Multiplied by large numbers of people, this represents a large amount of heat which must be removed. In addition to the sensible heat, each 5 spectators and each

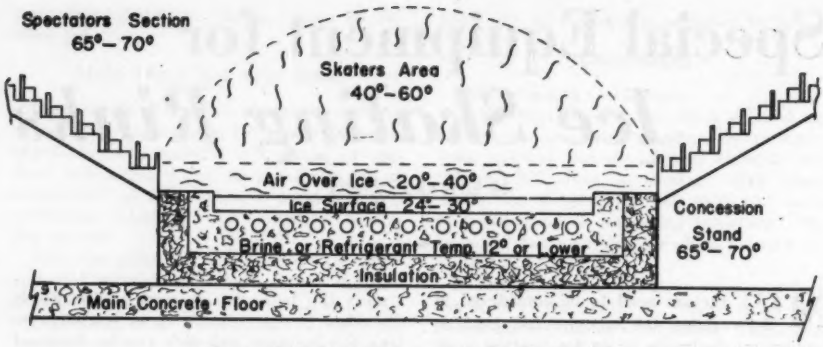


Fig. 1—Desirable temperatures for ice-skating rinks.

skater will probably release about a pound of water vapor per hour, in breathing and perspiration. A pound of water vapor is approximately equivalent to 1000 Btu of latent heat, as it will require the extraction of that much heat to condense each pound of vapor. Many rinks remove the vapor laden air with exhaust fans in the upper part of the structure. The exhausted air must be replaced, and unless the outside air is suitable, some measure of conditioning, as heating, dehumidifying, cooling, etc., may be necessary.

Another group of people, the spectators, who pay for the various exhibitions, are most comfortable at temperatures near 70 F, with moderate humidity. Heating will be necessary during the winter season. Cooling may be necessary during the summer. If best conditions are to be maintained, heating and cooling may be required alternately during moderate weather, or possibly at the same time if some spaces need heating and others cooling. Summarizing, air temperatures should be low, next to the ice, to prevent melting, moderately low for a few feet above the skating floor and moderately warm in spectators' sections. Equipment in various structures will vary from a minimum of refrigerating plant and skating floor, steam boiler with radiators in spectators' and concessions space and, perhaps, exhaust fans, to a complete air conditioning system. Different methods of attaining this requirement will be explained after considering the other problems.

Quality of Ice

The operator of a skating rink will be required to provide ice specifically suitable for various types of skating. For hockey, it must be hard over the entire surface. This is best accomplished by carrying a relatively thin sheet of ice, about ¾", and a temperature of about 24 degrees or lower at the ice surface. This will require brine or refrigerant temperatures of 12 F, or lower: The thicker the ice, the lower the coil temperature must be to maintain a given surface temperature, which means more power and less capacity in Btu per hour.

Public and figure skating requires ice of higher temperature, usually around 30 F. A thickness of about 1½" is usually used, giving uniformity of texture. The higher temperature ice holds skate blades, and greater thickness reduces danger of ice being cut through in shallow spots, if any. Coil temperature will probably be about the same as for colder ice, with less depth, usually about 10 F; lower, if rapid freezing is necessary.

Soft Spots

Soft spots on the ice sheet are usually caused by poor distribution of refrigerant or brine. Where brine is used, it rises in temperature as it flows through the coils, and the area over the higher temperature brine is softer than that over the low. The use of the hairpin coil, or alternate reverse flow system illustrated in the previous article reduces this tendency. Another method is to periodically reverse the flow of brine with a set of reverse valves, which may be connected to a single operating arm. The operator can reverse the flow by shifting the arm from one position to the opposite, simultaneously changing four valve settings. This method is illustrated in Fig. 2. It is espe-

cially applicable to cross flow coils, with supply header on one side, and return on the other, in which there is a tendency for the ice on the return side to soften.

Removing Ice

A major problem in many rinks, is the rapid removal of ice. Attempts have been made to use waste heat for this purpose. If storage space is available, the brine may be pumped out of the coil and heated water circulated through. A simpler, though less efficient method is to bypass the brine chilling tank and circulate the brine through a heat exchanger, using steam to add sufficient heat for rapid melting. It is often possible to remove a sheet of ice in about five hours, by starting the brine heating process a few hours before the ice is to begin melting, as it will take considerable time to bring it up to a melting temperature. This is a simple method, but it will require a large amount of fuel to supply the necessary heat, especially if the change from ice to other floor and back to ice has to be made often. This method requires a minimum of equipment.

Various methods may and have been used to store cold brine and circulate warm water or brine for ice melting. This involves additional tank storage space, a more complex piping and valve assembly and possibly additional pumping facilities. The system illustrated in Fig. 3 utilizes seven valves. With valves A, F, and G open and B, C, D and E closed the system will be in ice freezing position, with ice circulating from cold brine tank through floor coil. To pump down, preparatory to melting, open valves E, C and G; close A, B, D and F. To pass heated water through coils, close A, C, F and G and open B, D and F. To return water to warm water tank, C, D and E are opened and A, B, F and G closed.

The water for melting may be heated by passing the hot gas from the compressors through heat exchangers before going to the condenser. Heat thus saved may also be used to augment the heating system. Additional heat will probably be necessary for ice melting as the compressors will not be running at the time ice is being removed, and heat stored up while they were running may not be sufficient to remove the ice. Usually it is only necessary to loosen the ice from the floor so it can be broken up and removed.

Benefits of Air Conditioning

Most of the other major problems can be solved only by some measure of air conditioning, including:

(A) Maintenance of desired temperatures listed at the beginning of this article.
(B) Prevention of fog and sweating.
(C) Ventilation.

The equipment best suited to any particular

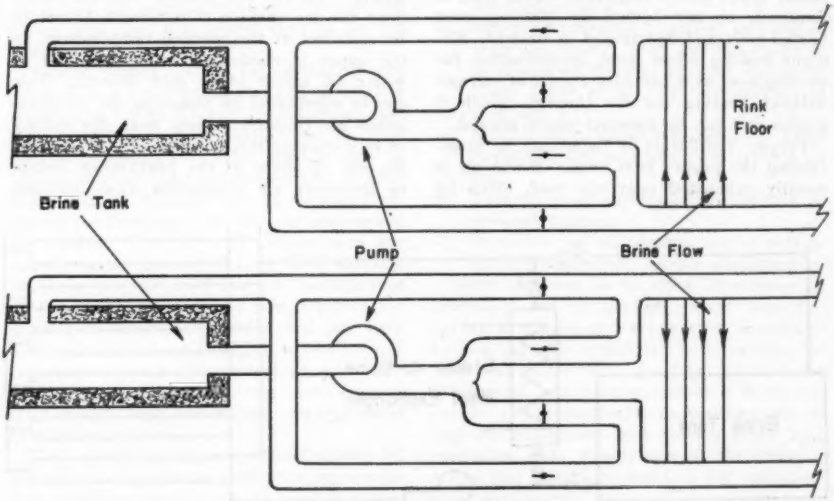


Fig. 2—Brine flow reversing valves.

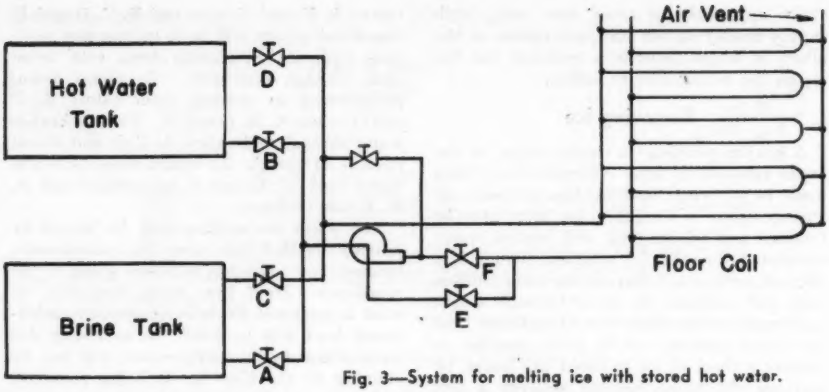


Fig. 3—System for melting ice with stored hot water.

installation will depend on the climate, the season when used for ice skating and use during the rest of the year, the number of occupants, spectators, skaters, etc., the type of structure and perhaps other variables. A comprehensive explanation of all possibilities would require an entire book but here, briefly, are the manner in which these problems are being met.

Cold air is maintained over the ice surface by preventing its disturbance by the ventilating and heating system or by distributing from outside, when suitable, or chilling by passing over cooling coils.

The heating system may be any conventional type; direct radiation where heat is required, or air heated by passing over heated coils and distributed as desired. Radiant heating offers good opportunities for development as it provides a sense of warmth without heating the air through which it passes and can be directed where needed.

Proper ventilation is important in maintaining the proper heat level. Warm air is usually exhausted near the roof, often by exhaust fans. Sufficient fan capacity should be provided to change the air at least ten times per hour but, in operation, the actual amount of air exhausted should be just enough to maintain desired conditions.

Fogging

One problem likely to occur in skating rinks is the appearance of fog for several feet above the ice surface. This is because the capacity of air to contain moisture is reduced when it is cooled. The large amount of moisture released by occupants goes into the air, giving it a high percentage of humidity. If, for any reason, this air comes near the ice surface it is unable to retain its moisture at the reduced temperature, so the vapor is condensed as fog or falls as water on ice or other cold objects. This can be eliminated by removing the moisture laden air through outlets near the ceiling or by removing the moisture by conditioning the air. Failure of the ventilating system or improper air circulation which permits

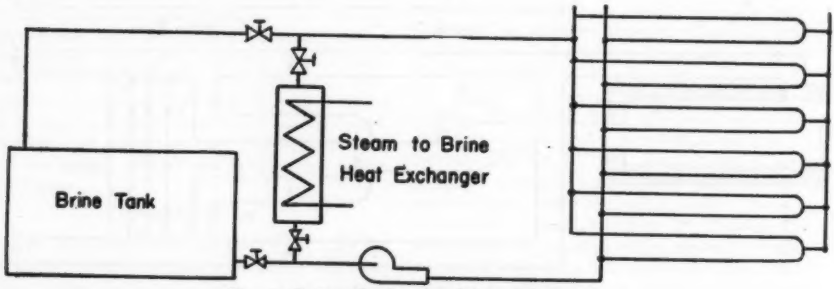


Fig. 4—System for heating brine with steam.

high humidity air to reach the vicinity of the cooler areas is responsible for this condition and correction will remedy it.

Getting the Most for Your Money

The success of a business enterprise is measured by profit. For the builder, operator or owner of an ice skating establishment this includes getting maximum results with equipment installed at a minimum cost for power, fuel, maintenance and labor. It also may demand additional or substitution of equipment necessary to achieve results otherwise impossible or uneconomical. Where equipment requires substantial capital expenditure, the depreciation, maintenance, space required, labor, power or fuel and interest on the investment should be weighed against the savings to be effected or increased profits to be realized.

The use of the refrigerating plant for air conditioning is readily accomplished, with an ammonia system, by chilling water or brine only to about 35 F. to 45 F. and using the chilled liquid in a surface coil in the conditioner. This water must not be used in an air washer as most state and local safety codes forbid the use of spray water in the air stream, which has been cooled by an irritant or toxic refrigerant due to the possibility of its presence in the water. It may, however, be used in a finned coil. If an air washer is to be used, the water may be cooled by passing through a coil in the brine tank, but not cooled directly by the ammonia.

Where "Freon" is the refrigerant, it can be used in a direct expansion coil or used to chill water for an air washer or surface coil. Air conditioning coils should not be connected in multiple with ice making coils as the capacity of the compressors will be seriously reduced because the low pressure required for freezing is too low for economical air cooling. Two or more compressors are usually installed in ice skating rinks and one of these may be used for air conditioning or for carrying the excess load required for quickly freezing ice. This works out very well because air conditioning is usually not required while ice is being formed, and after the ice is formed and the performance started both compressors will not be needed to maintain the ice.

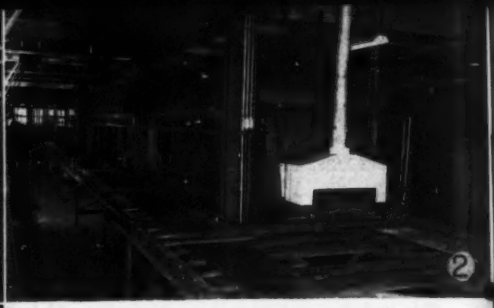
The capacity of the rink should always be divided between two or more compressors as it is decidedly more costly to operate a system with a compressor too large than with one about the right size: Therefore both should be used when ice is being formed and one shut down as soon as the sheet of ice is formed. Brine temperature should only be low enough to maintain the required quality of ice. Brine chilled for ice freezing should not be used for air cooling as the heat is removed from this brine at too low a pressure and temperature for economical air cooling. It will be much more satisfactory to operate another compressor so as to maintain a coil temperature of 40 F.

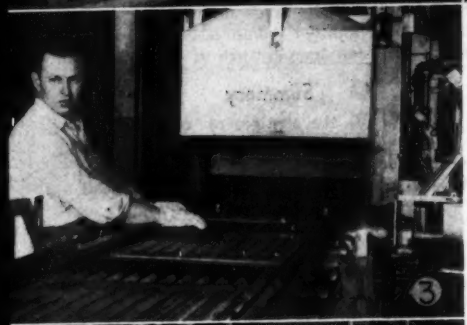
Summary

In general, the equipment required for efficient operation of an ice skating rink will include:

A. One compressor, sized to carry the load after ice is frozen.
B. One or more additional compressors sized to carry the additional load required for producing ice.
C. Two or more brine circulating pumps to provide variable velocity as load changes.
D. Brine heater or storage tanks for cold brine while ice is being removed by hot water, selection to be made on basis of overall economy including investment and maintenance and frequency of use.
E. Heating plant (if necessary) to provide heat for spectators and concessions.
F. Ventilating system to remove heat laden air, recirculate if desirable and matched with other equipment to maintain desired conditions.
G. Means to maintain a blanket of cold air over ice sheet. May be incorporated in design of floor to prevent escape of lower layer of air, of introduction of cold air.
H. Equipment to direct refrigerant or brine circulation to maintain even texture of ice.
I. Ventilation or dehumidifying system to prevent fogging.
J. Provision for economical use of refrigerating equipment for air conditioning.

Much remains to be done in improving operation and equipment. Heat now discarded in condenser water should be applied to heating the structure, with savings of fuel and water and, possibly, less capital investment. Automatic control is being improved and is applicable to skating rinks to improve conditions and reduce labor and operating cost. Plants now on the drawing board and under construction will undoubtedly incorporate some of these improvements.





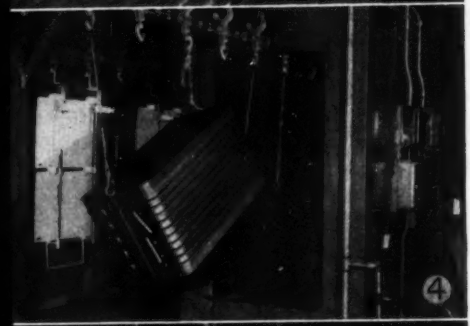
KOLD-HOLD NEW PRODUCTION METHOD IMPROVES PRODUCT

RECENTLY the Hold-Kold Manufacturing Co. of Lansing, Mich., manufacturers of Serpentine Plate Type Evaporators, enlarged and modernized their production facilities. An entire new hydrogen brazing process was inaugurated. By this method, a more perfect seal is obtained at joints and the interior of the plate is free from foreign substances.

Serpentine Plates consist of two surface sheets joined and hermetically sealed. One sheet is flat while the other is embossed to form channels for the passage of the coolant. Prior to brazing, the sheets are run through a steam cleaner to remove all impurities. (Fig. 1.) The two surfaces of the plate are then lined up with a thin sheet of copper material between them and the plate goes to the Hydrogen Brazing Oven at a temperature of 2500 F. (Fig. 2.) The copper flows at this heat into every corner to make a perfect seal.

Each plate passes over an open flame which burns off all gases as it enters the oven. (Fig. 3.) An electric eye opens and closes the door to the oven and the oven itself is filled with pure hydrogen from gas converters installed above the oven. The exterior surface of the plate is then cleaned in an acid bath and washed in a metal washer to make a better bond between the enamel finish and the metal. (Fig. 4.) From here it moves through the drying chamber (Fig. 5) past a series of infra-red lights to the spray booth. (Fig. 6.) The enamel finish is baked on by infra-red lights at a temperature of 350 F. (Fig. 7.) This provides the plates with long lasting and durable finish. The completed plate is then carried by conveyor to the warehouse awaiting shipment.

This new method has stepped up the production of evaporator plates, thereby reducing the unit cost. It has eliminated any possibility of foreign substances remaining in the plates eventually causing them to clog. It has assured long lasting seal of all joints giving Kold-Hold a more salable product.



By DONALD F. DALY

CONTRACT REBUILDING SERVICE

I HAVE no intention of presenting a method of estimating for household and package units. It would be too involved, and in all probability the average serviceman is better equipped to deal with his particular problem than I am. However, it might be interesting to present a few facts and figures which could be used as a guide in setting up price schedules for contract service.

In setting up such schedules between a service organization and an appliance dealer you will have to have some factors on which you can base your estimated costs for service and overhaul jobs. In addition to the casual service work that will come your way in the normal course of business, you will also be asked to make estimates for overhauling and reconditioning trade ins. In fact you may be required to set a flat price for such work before you actually get it. This is not difficult if you have the completion records on a sufficient number of re-build jobs to use as a base for your estimates, but where you have had only an occasional re build job it is hard to arrive at a competitive price. That is, a price that will allow you to come out on your repair bill, and at the same time let the dealer resell the box at a profit to him.

In many instances the trade-in should be junked, though it may be hard to convince the dealer who has made a considerable allowance on the old box that this is the case. Another thing to be sure of in writing up your contract service agreement, is that you get all of the junkers. Even though such units may not be worth fixing up for re-sale, they will supply quite a bit of salvage material. Material that can be used in rebuilding other units and will have considerable bearing on the cost of your re-conditioning jobs.

The cost of rebuilding trade ins will vary from place to place and it is difficult to arrive at an average cost factor for such work that will cover every eventuality. The only thing you can do is set up an average cost based on your experience and whatever job records you have on hand. If that doesn't work out—revise your average cost estimate until you can operate at a profit. Now for some facts and figures for doing such work. (All of the figures that follow are based on the assumption that you will have a volume of business and that all units will be completely reconditioned and sold under a guarantee.)

The cost of contract rebuilding of domestic units, water cooler units and other small packaged units in quantity lots is the subject of discussion by the author this month. A rebuilding service of this kind can be a lucrative addition to regular services, but rates must be carefully set up.

In 1938 I worked for a large service organization in Los Angeles, California. This firm specialized in re-building trade-ins for dealers. Their price for re-building household units and putting them in such condition that they could be guaranteed for six months was $20.00 per unit. Regardless of its condition. They did, however, reserve the right to decide which units should be re-built, and which units should be junked. They also got all of the salvaged material from these junkers.

I doubt very much if similar units could be re built at this time for a price of $20.00. Material and labor have gone up quite a bit since that time, and so have all the other factors involved. At that time a first class refrigeration service engineer was doing well if he received a salary of $35.00 per week. And in most cases this $35.00 salary was not based on a forty hour week. In fact, servicemen frequently worked sixty, or more, hours a week and there was no such thing as overtime pay.

The idea was that you were to work the long hours during the busy summer months, and then take it easy during the off season. It didn't always work out

the end of the service season or they kept you busy on some other type of work. Men who have come into refrigeration service work in the past five or six years may find it hard to believe that such conditions ever existed. But they did. Ask any old timer.

ART ANDERSON
WE WONT NEED YOU ANYMORE JACK, UNTIL SPRING-SO YOU JUST TAKE A GOOD LONG REST AND TAKE IT EASY EH?
DRS. FIXUM & KILLUM SPECIAL FALL RATES FOR OVERWORKED SERVICE MEN

Now, however, the situation is changed (thank heavens), and it is a rare serviceman who cannot command a salary of $60.00 per week and extra pay for overtime. It is not unusual for a competent service engineer to average from $75.00 to $100.00 a week during the busy season. This is all to the good, and I don't believe that any of us want to go back to the "good old days." But it is going to make a lot of difference in the cost of re-conditioning refrigerators.

Source of Figures

In order to get some figures on the cost of re-building household and package units I went to an organization which has, in the past two years, overhauled and rebuilt several thousand such units. I am deeply grateful to Fred Esser, owner and operator of Refrigeration Components in San Francisco, who allowed me free access to his files of job cost records and also spent a lot of time in going over these records with me.

When it was first organized Refrigeration Components intended to engage in installation and service on large commercial, industrial, and marine refrigeration equipment. But they soon found that it was impossible to avoid service work on small units. Too many owners of commercial equipment were also owners of household and package units. For instance, some ships, especially troop transports, have as many as eighty self-contained units, ranging in size from a four cubic feet domestic unit to a good sized reach-in box. They also have a lot of water coolers. Then too, they do a lot of work for Army and Navy establishments, and they had to bid on the small stuff in order to bid on the large equipment.

When they first started to service and re-build small units they ran into a lot of trouble and lost a lot of money, partly because they were not equipped to do the work, and partly because their mechanics were not experienced in such work. But, as time went on and they gained in experience, and they accumulated enough job cost records so that they had some tangible figures on which they could base their bids, this work developed until it is now one of the most profitable branches of their business.

"We do not, as a rule," said Mr. Esser, "bid on a single unit. In most cases our bids cover anywhere from five to seventy-five units. In some instances, where we bid on the rebuilding of surplus or salvaged units for the Army or Navy, several hundred units are covered by one bid. Where we do have to bid on a single unit we have a standard price of $40.00 per unit, regardless of its condition. Sometimes we get stuck rather badly at this price, but over a period of time we find that this price will average out and allow us to make a reasonable profit." (Mr. Esser found it necessary to set up an average price for such work because they usually submit their bids without ever seeing the units involved.) "It just isn't possible," he continued, "to go out and make an estimate on each individual unit. However, there is a clause in most of our bids which allows us to ask for replacement where a unit is too badly damaged to be repaired."

Average Costs in Quantity

Since the figures I am going to quote are based on average costs for rebuilding units in lots of five or more, they are not intended to be used as a base for bidding on individual units. But they might be useful in showing a pattern for setting up price schedules for contract servicemen and appliance dealers. I didn't undertake to make a complete survey of all the job records in the files of Refrigeration Components. What I did was pull ten job record sheets at random from a file containing several thousand such records. The averages obtained from these ten job sheets, covering 128 units, will not tell the whole story, but they will show a pattern which might be useful.

A recap of these ten job record sheets shows the following totals.

Total number of units	128
Total cost for labor and material	$4626.00
Total cost of labor—1079 man-hours—$3.00 per hour	3238.00
Total cost of material	1388.00
Average labor cost per unit	25.50
Average material cost per unit	10.85
Average cost per unit for labor and material	36.35

I have used the nearest round figures. So if the totals don't exactly agree, don't worry about it.

I cannot, of course, be sure that the average cost for all of the several thousand units completed by this firm will average out at $36.35, but I do believe that this figure is close enough for all practical purposes. I must repeat once again, these figures are intended to show a pattern only, and should not be used as a basis for setting up average costs.

Your situation may be entirely different from the one that exists in this area. For instance, Refrigeration Components buys its material in large quantities and they might get discounts that you would not be allowed. Then too, they have a labor charge rate of $3.00 per hour, and their average rate of pay for mechanics is $1.60 per hour. That $1.60 rate is for an eight hour day and a forty hour week. Any time in excess of eight hours a day, and forty hours a week, is paid at the double time rate.

If you should find it necessary to set up a cost schedule for rebuilding household units in drawing up a service contract with an appliance dealer these figures might be of some value, but you alone know all the facts about your organization, competition, and local conditions as to wages and hours. You have to set your price low enough to get the business, and at the same time have them high enough to show a profit. But you can be sure of one thing—it is better to pass a deal up if you can't make money.

It may be necessary at times to do certain "political jobs" at a low price, with the idea of getting an "in" and building good will. But don't be misled by this device. Many dealers and customers will promise you "pie in the sky" if you will cut your price on this "one job." But don't forget—you have to be dead to enjoy that pie, and your business will certainly be dead if you allow yourself to be taken in. Whatever price schedules you set up, stick to those price schedules. If they need revision—make such revisions—but don't let anyone pay you off with promises.

I said I wasn't going to present a method of estimating for household and small package units, but it seems to me that it would be possible to arrive at an average cost factor that could be used as a guide in such work. For instance, I find that a recapitulation of the job records quoted, shows that labor runs about 70% of the total cost, and material runs about 30%. I am inclined to believe that the hourly charge rate of $3.00 is a little higher than the average charge rate throughout the United States.

In this case all of the work was done by hired men. In the case of an independent serviceman, or a couple of men working as partners, it might be possible to operate at a lower charge rate and still make money. Then again, even if the average charge rate for labor at this time is $3.00 per hour, I doubt if it will hold at that figure for very long.

Suppose we try to strike an average somewhere between the hourly charge rate used before the war and the hourly charge rate used at this time. To have something to use as a base for arriving at this average I pulled job record cards from my files which were accumulated during 1939. I can't, of course, exactly duplicate the 128 jobs that I used in setting up the first set of figures, but I did select job record cards that covered complete overhaul or re-build jobs. My charge rate for labor at that time was $1.50 per hour. I don't know exactly how much material has gone up in price since 1939, but I imagine about 30%.

A recap of these 1939 job records gives the following totals.

Total number of units	128
Total cost for labor and material	$2280.00
Total cost for labor—1064 man-hours—$1.50 per hour	1596.00
Total cost of material	684.00
Average labor cost per unit	12.50
Average material cost per unit	5.35
Average cost per unit for labor and material	17.85

Now suppose we take the average cost per unit for 1939, and the average cost per unit for 1947, and average them.

Average cost per unit in 1939—Labor and Material	$17.85
Average cost per unit in 1947—Labor and Material	36.35
Average cost found by totaling the two sets of figures and dividing by 2	$27.10

the end of the service season or they kept you busy on some other type of work. Men who have come into refrigeration service work in the past five or six years may find it hard to believe that such conditions ever existed. But they did. Ask any old timer.

WE WONT NEED YOU ANYMORE JACK, UNTIL SPRING-SO YOU JUST TAKE A GOOD LONG REST AND TAKE IT EASY EITCH
DRS. FIXUM & KILLUM SPECIAL FALL RATES FOR OVERWORKED SERVICE MEN

Now, however, the situation is changed (thank heavens), and it is a rare serviceman who cannot command a salary of $60.00 per week and extra pay for overtime. It is not unusual for a competent service engineer to average from $75.00 to $100.00 a week during the busy season. This is all to the good, and I don't believe that any of us want to go back to the "good old days." But it is going to make a lot of difference in the cost of re-conditioning refrigerators.

Source of Figures

In order to get some figures on the cost of re-building household and package units I went to an organization which has, in the past two years, overhauled and rebuilt several thousand such units. I am deeply grateful to Fred Esser, owner and operator of Refrigeration Components in San Francisco, who allowed me free access to his files of job cost records and also spent a lot of time in going over these records with me.

When it was first organized Refrigeration Components intended to engage in installation and service on large commercial, industrial, and marine refrigeration equipment. But they soon found that it was impossible to avoid service work on small units. Too many owners of commercial equipment were also owners of household and package units. For instance, some ships, especially troop transports, have as many as eighty self-contained units, ranging in size from a four cubic feet domestic unit to a good sized reach-in box. They also have a lot of water coolers. Then too, they do a lot of work for Army and Navy establishments, and they had to bid on the small stuff in order to bid on the large equipment.

When they first started to service and re build small units they ran into a lot of trouble and lost a lot of money, partly because they were not equipped to do the work, and partly because their mechanics were not experienced in such work. But, as time went on and they gained in experience, and they accumulated enough job cost records so that they had some tangible figures on which they could base their bids, this work developed until it is now one of the most profitable branches of their business.

"We do not, as a rule," said Mr. Esser, "bid on a single unit. In most cases our bids cover anywhere from five to seventy-five units. In some instances, where we bid on the rebuilding of surplus or salvaged units for the Army or Navy, several hundred units are covered by one bid. Where we do have to bid on a single unit we have a standard price of $40.00 per unit, regardless of its condition. Sometimes we get stuck rather badly at this price, but over a period of time we find that this price will average out and allow us to make a reasonable profit." (Mr. Esser found it necessary to set up an average price for such work because they usually submit their bids without ever seeing the units involved.) "It just isn't possible," he continued, "to go out and make an estimate on each individual unit. However, there is a clause in most of our bids which allows us to ask for replacement where a unit is too badly damaged to be repaired."

Average Costs in Quantity

Since the figures I am going to quote are based on average costs for rebuilding units in lots of five or more, they are not intended to be used as a base for bidding on individual units. But they might be useful in showing a pattern for setting up price schedules for contract servicemen and appliance dealers. I didn't undertake to make a complete survey of all the job records in the files of Refrigeration Components. What I did was pull ten job record sheets at random from a file containing several thousand such records. The averages obtained from these ten job sheets, covering 128 units, will not tell the whole story, but they will show a pattern which might be useful.

A recap of these ten job record sheets shows the following totals.

Total number of units	128
Total cost for labor and material	$4626.00
Total cost of labor—1079 man-hours—$3.00 per hour	3238.00
Total cost of material	1388.00
Average labor cost per unit	25.50
Average material cost per unit	10.85
Average cost per unit for labor and material	36.35

I have used the nearest round figures. So if the totals don't exactly agree, don't worry about it.

I cannot, of course, be sure that the average cost for all of the several thousand units completed by this firm will average out at $36.35, but I do believe that this figure is close enough for all practical purposes. I must repeat once again, these figures are intended to show a pattern only, and should not be used as a basis for setting up average costs.

Your situation may be entirely different from the one that exists in this area. For instance, Refrigeration Components buys its material in large quantities and they might get discounts that you would not be allowed. Then too, they have a labor charge rate of $3.00 per hour, and their average rate of pay for mechanics is $1.60 per hour. That $1.60 rate is for an eight hour day and a forty hour week. Any time in excess of eight hours a day, and forty hours a week, is paid at the double time rate.

If you should find it necessary to set up a cost schedule for rebuilding household units in drawing up a service contract with an appliance dealer these figures might be of some value, but you alone know all the facts about your organization, competition, and local conditions as to wages and hours. You have to set your price low enough to get the business, and at the same time have them high enough to show a profit. But you can be sure of one thing—it is better to pass a deal up if you can't make money.

It may be necessary at times to do certain "political jobs" at a low price, with the idea of getting an "in" and building good will. But don't be misled by this device. Many dealers and customers will promise you "pie in the sky" if you will cut your price on this "one job." But don't forget—you have to be dead to enjoy that pie, and your business will certainly be dead if you allow yourself to be taken in. Whatever price schedules you set up, stick to those price schedules. If they need revision—make such revisions—but don't let anyone pay you off with promises.

I said I wasn't going to present a method of estimating for household and small package units, but it seems to me that it would be possible to arrive at an average cost factor that could be used as a guide in such work. For instance, I find that a recapitulation of the job records quoted, shows that labor runs about 70% of the total cost, and material runs about 30%. I am inclined to believe that the hourly charge rate of $3.00 is a little higher than the average charge rate throughout the United States.

In this case all of the work was done by hired men. In the case of an independent serviceman, or a couple of men working as partners, it might be possible to operate at a lower charge rate and still make money. Then again, even if the average charge rate for labor at this time is $3.00 per hour, I doubt if it will hold at that figure for very long.

Suppose we try to strike an average somewhere between the hourly charge rate used before the war and the hourly charge rate used at this time. To have something to use as a base for arriving at this average I pulled job record cards from my files which were accumulated during 1939. I can't, of course, exactly duplicate the 128 jobs that I used in setting up the first set of figures, but I did select job record cards that covered complete overhaul or re-build jobs. My charge rate for labor at that time was $1.50 per hour. I don't know exactly how much material has gone up in price since 1939, but I imagine about 30%.

A recap of these 1939 job records gives the following totals.

Total number of units	128
Total cost for labor and material	$2280.00
Total cost for labor—1064 man-hours—$1.50 per hour	1596.00
Total cost of material	684.00
Average labor cost per unit	12.50
Average material cost per unit	5.35
Average cost per unit for labor and material	17.85

Now suppose we take the average cost per unit for 1939, and the average cost per unit for 1947, and average them.

Average cost per unit in 1939—Labor and Material	$17.85
Average cost per unit in 1947—Labor and Material	36.35
Average cost found by totaling the two sets of figures and dividing by 2	$27.10

Thus we have set up an arbitrary, and wholly imaginary, figure of $27.10 for rebuilding small refrigeration units. Such a figure could be used only if you had a volume of business so that you would have a chance to average out. If you tried to rebuild individual units at this price you would certainly wind up behind the eight ball.

I also want to point out that the material cost factor in both the 1939 and 1947 figures is rather low. Probably due to the fact that quite a bit of salvage material was used in both instances. It takes time to dismantle the junkers and to put the salvaged parts in good working condition. This time was, of course, charged to the unit on which the salvaged material was used.

I am quite sure that the labor factor in rebuilding small units will always be the largest single item of cost. But if all new material were used the ratio of labor to material would be somewhat lower. Instead of the 70% for labor and 30% for material shown in these figures, the actual ratio of labor to material might be as low as 60% for labor and 40% for material. But, whatever the ratio, your cost for rebuilding units will remain fairly constant.

The only way you could reduce your average cost per unit would be to have a very efficient organization; buy your material more cheaply; or have a lower hourly charge rate for labor. But, I must point out once again—there is no use in doing a job if you can't make money.

Specialties Build Volume

By HERBERT HANLEY

COMPLETE "departmentalization" of various types of refrigeration work and an intensive prospecting program have doubled the annual volume of business done by Allied Refrigeration Service, at 1334 Fifteenth street, Denver, Colo.

Starting out as a household-refrigerator repair concern, Allied now covers commercial refrigeration repair, custom refrigeration manufacture, domestic refrigeration service, trade-in refrigerator rebuilding for stores and other dealers, and specialized service for refrigerator truck bodies. All of them have their place in the scheme of things, according to Dean Haggerdt, owner, because one phase of the business inevitably picks up when another falls off. The company also has a large sheet-metal shop turning out air conditioning and ventilating ductwork, plenum chambers, and custom-made refrigerators and coolers.

Right now, due to the prevailing scarcity and high price of new refrigerators, the domestic refrigeration department is particularly "hot," according to Mr. Haggerdt. What had formerly been a one-man operation, domestic refrigerator overhaul and repair has grown into a large shop employing 6 men, with a separate electric motor shop, and a cabinet shop in which refrigerators are completely rebuilt, including new paint jobs, and new hardware. Three full-time men are employed in each shop, with a volume split about fifty fifty between dealers and private individuals.

Trade-ins Coming Back

"A lot of dealers are already finding it necessary to accept trade-ins," it was pointed out. "Therefore, we give a dealer with no service facilities some chance to come out on the trade-in allowance." Refrigerator repairs are carried out on a flat-charge basis, of varying amounts according to whether the customer wants it painted or not, and whether the Allied firm must give a guarantee. After much experimentation, Allied has set $8 as the price of a year's guarantee on any domestic refrigerator, which the appliance dealer may pay, and rid himself completely of maintenance headaches. Domestic refrigerators, after rebuilding, are sold with $8 added on to the cost for a year's guarantee, or minus the $8 where the appliance dealer wants to maintain his own warranty to the customer.

In the rebuilding shop, every refrigerator gets a new motor, or a rebuilt motor, complete cleaning inside and out, repainting, new hardware, and new controls where necessary. "We don't handle any sealed units

A portable evacuating unit used in servicing truck refrigerating systems is mounted on the hood of the truck.

at all," Mr. Haggerdt said, "but we do rebuild electric motors, rebuild compressors, manufacture all parts and controls and do painting where needed. By turning out plenty of domestic refrigerators, we are helping to keep many dealers going."

Large as it is, the household refrigerator department is actually the smallest operation. The commercial refrigeration department is averaging better than $13,000 a month in sales, and as high as $15,000. Responsible for this is a large amount of repair service on commercial refrigerators in drug stores, grocery stores, flower shops, etc., plus the manufacture of custom walk-in refrigerators for stores, ranchers, mountain resorts, etc.

Most unusual service developed by Allied Refrigeration Service is refrigerated truck repair service. Allied has worked out a portable vacuum puller, or electric vacuum pump, mounted on rubber-footed wooden blocks, which can be set on the truck hood, to extract the refrigerant from truck body cooling systems. Supplied with 100 feet of cord, this unit has simplified truck repairs immensely—and the curb in front of the Fifteenth street office is almost always occupied by refrigerated meat, dairy and frozen food trucks undergoing a tuneup.

Construction and Operation of The Admiral Dual-Temp Refrigerator

This is the second in the series of articles, taken with permission from the Admiral Corporation service manual, describing the operation and construction of the Dual-Temp Models TD746 and TD946.

Testing the Unit

THE unit, including the starting relay and overload protector, may be conveniently tested by connecting "direct." This is accomplished by removing the unit power cord plug (P Fig. 6) from the junction box and connecting it through an extension cord "direct" to a power outlet. The extension cord should be as short as possible to avoid a large voltage drop.

Normally, no refrigeration will take place in the food compartment when the unit is tested direct because the restrictor is out of the circuit.

When connected "direct," all of the wiring in the cabinet is out of the unit circuit. If the unit runs satisfactorily when connected direct, but will not run when connected to the junction box, there is an open circuit in the wiring or in the locker temperature control.

A minimum of 95 volts is required to start the unit. If the unit fails to start when connected direct, and the voltage at the motor terminals is at least 95, test with an Admiral unit analyzer to localize the trouble. In the event that an analyzer is not available, check the overload protector and starting relay as follows:

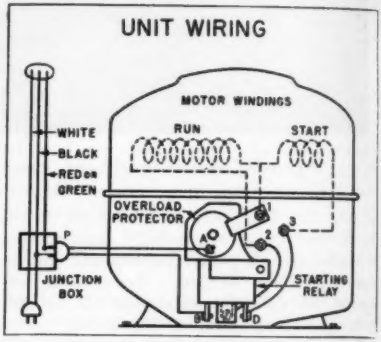


Fig. 6—Unit Wiring

Pull Down Overload

If the refrigerator is started up when warm with both temperature controls turned on, the "pull down" load may overheat the unit and cause the overload protector to trip repeatedly. This is most apt to occur if the room is above 110 F. due to the great amount of heat which must be removed from the hot insulation and cabinet interior.

A pull down overload does not indicate a defective unit. Do not shunt out the overload protector if overload protector trips when first starting up the refrigerator. To prevent this "pull down" overload, the Dual-Temp should be started as follows:

1. Turn the food compartment temperature control off and the locker control to "N."
2. Allow the refrigerator to run until the

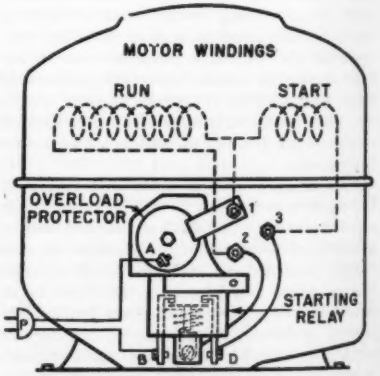


Fig. 7—Motor windings and relay outline.

locker has cooled down, then turn the food compartment control to "N" and allow at least thirty minutes before loading with food or attempting to make ice cubes.

Testing the Overload Protector

Caution: The following test must not be made if the unit is overheated for any reason.

A defective overload protector will stick open. When this occurs, the unit will not run or make any attempt to start. To test for an open overload protector, move the unit power cord wire (see Fig. 7) from A to 1 (this eliminates the overload protector from the circuit), and again test direct as indicated above. If the unit now starts, the overload protector is open.

Caution: Do not leave power on for more than 5 seconds if unit fails to start. Do not allow the unit to run for any length of time without an overload protector as this may burn out the motor.

Testing the Starting Relay

A "stuck" starting relay will cause the overload protector to trip. A starting relay that "sticks open" will prevent starting and cause the overload protector to trip. A

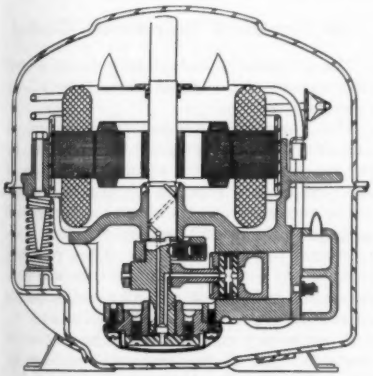


Fig. 9—Cutaway View of Unit

starting relay that "sticks closed" will allow the unit to start and immediately thereafter cause the overload protector to trip. To check for a stuck relay, first disconnect the refrigerator. Then move the power cord wire from B to 2 (Fig. 7), disconnect jumper from D and make a "touch" contact with it on 2. Turn on the power and if the unit starts, immediately pull the jumper off of 2; if the unit continues to run without tripping the overload protector, install a new starting relay.

If the unit fails to start, or runs but starts to overheat, one of the motor windings is shorted. The remedy is to replace the sealed unit.

Noisy Unit

The sealed unit is internally mounted on springs as shown in Fig. 9. If one of the mounting springs breaks, a "hammering" noise results. This hammering noise may develop in a good unit if the refrigerator is badly out of level because of a sagging or uneven floor. Check refrigerator for level before replacing a unit that is noisy but otherwise operating satisfactorily.

Cabinet Sealing

The development of the sealed cabinet used in the Admiral Dual-Temp ranks second in importance only to the independently-controlled secondary system perfected by Admiral engineers. The purpose of sealing the cabinet is to prevent "breathing" (air circulation) into the insulation. By completely sealing the insulated cabinet space, moisture laden air cannot penetrate into the insulation and thus reduce insulation efficiency. To emphasize the importance of keeping the insulation dry by carefully re-sealing the cabinet, the following explanation is made.

The construction of the Dual-Temp differs in many ways from that of other refrigerators. In a conventional refrigerator, the cooling coils are located inside of the food compartment and provision is made for disposing of accumulated moisture by defrosting. In the Dual-Temp, moisture cannot accumulate on the cooling coils because they are located on the outside of the freezing locker, and are thus sealed off in the cabinet insulation. It can immediately be seen that so long as the cabinet seal is intact, moisture-laden air cannot penetrate into the insulation and form frost on the cooling coils.

If for any reason the cabinet seal is broken (as, for example, when a unit or a temperature control replacement must be made) and the cabinet is not carefully re-sealed, sufficient frost may eventually accumulate on the cooling coils to seriously impair the operating efficiency of the refrigerator. A

condition of this kind is known as "moisture penetration," the harmful results of which may sometimes be observed in commercial ice cream cabinets. When extensive moisture penetration occurs in such equipment, the insulation efficiency is impaired to such an extent that condensation occurs on the outside of the cabinet and rusting frequently results.

Extensive moisture penetration may short circuit the electrical system to the cabinet by conduction through a water film; the cabinet is said to be "alive" or "hot" and a complaint of electric shock usually results.

The various gaskets and sealing compounds used in the original assembly of the Dual-Temp refrigerator must be carefully replaced to restore the original sealing efficiency after performing any service operation in which the seal has been broken. The foregoing also applies to sealing the door on the Dual-Temp even though the sealing requirements are slightly less severe than is true of the cabinet.

When repairing any type of transportation damage, it is well worth while to lay the refrigerator on its back and carefully examine the machine compartment, especially where the sides of the cabinet are sealed to the top of the machine compartment. If any evidence of a cracked or open seal is found, the cabinet should be re-sealed with No. 40R permagum. Permatex No. 2, obtainable at automotive supply stores, may be used as an emergency substitute for permagum. Do not use sealing compounds that harden (become brittle). It is recommended that the serviceman have a supply of No. 40R permagum in his kit at al times.

Control Calibration

A quick check on the approximate calibration of the primary (locker) control may be made by freezing a thermometer near the center of the bottom of the locker. At the "N" (normal) position of the locker control knob, the refrigerator should start when the temperature is between 5 and 10 F., and should turn off when the temperature is between 0 and 5 degrees below zero. These are not the exact calibration temperatures. To more accurately check the primary temperature control calibration, proceed as follows:

1. Remove the rear cover plate and attach the bulb of a remote reading dial thermometer to the tubing at the locker inlet. Scrape off the hydrolene from the tubing to assure good contact with the thermometer bulb.

2. To prevent moisture condensation while testing the control, replace the rear cover plate, bringing the thermometer tube out under the edge of the gasket.

3. Turn the primary temperature control to the "N" position and turn the secondary (food compartment) control to the off position. Observe the temperature readings over several successive cycles. If the cut-in and cut-out temperatures vary from one cycle to another (erratic operation), check the control tube for proper contact in the well. The tube must be inserted into the well for a distance of 10 inches.

When the control tube is correctly located in the well and the knob is set at "N," the control should turn on between 5 and 10 F. and turn off between 1 degree below zero and 6 degrees below zero. If the cut-in and cut-out temperatures do not fall within these limits, or if the cut-in and cut-out temperatures vary from one cycle to another, the control should be replaced. Internal adjustment to correct control calibration is not recommended. Usually a control that is erratic or off calibration has developed some mechanical defect which may cause further trouble if an attempt is made to adjust the calibration.

The Secondary Temperature Control

The secondary control tube is in a well fastened to the vertical riser tube of the secondary system.

The secondary temperature control is normally "cycled" (turned on and off) by the temperature of the secondary system. If the control tube touches the transfer plates or is too close to the locker, the control may be "held open," causing the food compartment to run too warm. When properly located, the secondary control tube will have insulation between it and all possible points of contact with the liner of the locker.

A secondary control that is open (switch contacts open all the time) will prevent refrigeration in the primary transfer plate since the coil circuit will always be open. The same condition may occur as the result of a loose connection at one of the wiring terminals. To check for loose connections or an open secondary control, connect a test lamp across the restrictor coil terminals. When both temperature controls are clicked on by rotating the knobs to the right, the test lamp should light up. (Disconnect the unit from the junction box during this test.)

Checking the Secondary Control Calibration

To check the calibration of the secondary temperature control, proceed as follows:

1. Pull the secondary control tube out of the well and clamp it to the primary transfer plate alongside the bulb of a remote-reading thermometer.

2. Replace the insulating pads to insulate the control tube from the locker. Replace the rear cover, bringing the thermometer tube out under the edge of the cover gasket.

Do not run the refrigerator with the rear cover off, as this will allow moisture to accumulate in the insulation.

3. Turn the secondary control to "N" and the primary (locker) control all the way to the right. Start up the refrigerator and observe the temperature readings over several successive secondary cycles. The control should cut-in between 27 and 33 F. and cut-out between 21 and 25 F.

If the control is off calibration, it should be replaced. If the cut-in and cut-out temperatures are not the same for successive cycles, check for erratic operation as instructed in the following.

Erratic Operation

Erratic operation of the restrictor is evidenced by unreliable refrigeration of the food compartment—too warm at times, and too cold (freezing) at other times. Since the action of the restrictor depends upon correct performance of the secondary temperature control, it is necessary to first determine whether erratic operation is due to (a) "hanging up" in the secondary temperature control (b) intermittent "open" in the coil circuit (due to a loose connection) or (c) whether the restrictor plunger is sticking.

Connect the secondary temperature control tube and the bulb of a remote-reading thermometer to the primary transfer plate. Place the thermometer on top of the refrigerator, connect the leads of a test lamp to the restrictor coil terminals, and install the insulating pads. Replace the rear cover, bringing the thermometer tube and test lamp leads out under the edge of the cover gasket.

Turn the secondary control to "N" and the primary (locker) control all the way to the right. Observe the temperature readings as the secondary cycles on (lamp lights) and off (lamp goes out). If the cut-in and cut-out temperatures are not the same for successive cycles, the control is erratic and should be replaced.

If the primary transfer plate temperature does not "follow" the cycling of the secondary control, check for erratic operation of the restrictor, instructions for which follow.

The Restrictor

When the secondary temperature control closes and energizes the restrictor coil, the current flowing through the coil sets up a magnetic field that "picks up" the plunger. As the plunger is thus raised, the "by-pass" across the primary transfer plate is restricted and most of the refrigerant flows through the primary transfer plate coils. Since the operation of the restrictor depends upon the magnetic lifting force developed by the coil, obviously any condition responsible for an "open" in the coil circuit will prevent normal operation and in so doing, will stop refrigeration in the food compartment.

Testing the Restrictor

Complaints of "too warm" or "no refrigeration in the food compartment" indicate the possibility of an open coil circuit or a stuck restrictor. To determine whether failure to refrigerate in the food compartment is due to an open electrical circuit or a stuck restrictor plunger, proceed as follows:

1. Disconnect the unit from the junction box.

2. Open the door and allow the refrigerator to warm up until both controls can be "clicked on" by rotating the knobs to the right from the off position. If the secondary control cannot be clicked on, the control is either defective or is being "held open."

3. When both controls can be "clicked on," turn the control knobs all of the way to the right and then repeatedly plug the refrigerator power cord into the wall outlet. Since the unit is not in the circuit, a click should be heard as the plunger drops each time the power cord is pulled out of the wall outlet.

4. If no plunger click is heard, an open circuit or a stuck plunger is indicated. Remove the cabinet rear cover and connect a test lamp across the restrictor coil terminals.

5. With the unit still disconnected from the junction box, plug the refrigerator power cord into the wall outlet and note whether the test lamp lights up.

6. If the test lamp does not light, check for an "open" secondary temperature control as described under "The Secondary Temperature Control." Eliminating the cause of the open circuit will restore the restrictor to normal operation.

7. If the test lamp lights when the refrigerator power cord is plugged into the wall outlet, remove the hair-pin spring and lift the restrictor coil up on the plunger tube. A pronounced magnetic pull will be noticed if the coil winding is not open. If no magnetic field is set up by the coil and current is definitely reaching the coil terminals (as indicated by the lighted test lamp), the coil is defective and must be replaced.

8. If the coil is "alive" but no plunger click is heard when tested according to No. 3, stated previously, the plunger is stuck. When the plunger sticks in the down position, no refrigeration occurs in the primary transfer plate and no cooling takes place in the secondary system. If the plunger sticks in the closed (up) position, refrigeration will occur in the primary transfer plate whenever the unit runs. A complaint of "too cold" or "food freezes" usually results.

Tapping the plunger tube will sometimes release a stuck plunger but this remedy is usually temporary. The only certain remedy is to replace the sealed unit. Before replacing a unit, carefully re-check to make certain that the replacement is necessary because of a stuck restrictor plunger.

Erratic Operation of Restrictor

To check the restrictor for erratic operation, first test the secondary control as instructed under "Erratic Operation." When the secondary control has been eliminated as a possible cause for erratic operation, check the restrictor as follows:

Note the thermometer reading after the secondary control turns off (light goes out). If the temperature continues to go down, the restrictor plunger is sticking in the "up" position. A condition of this kind will cause complaints of "too cold," "foods freeze," etc.

If the secondary control clicks on (test lamp lights up), but the thermometer reading does not start downward, the restrictor plunger is sticking in the down position. This condition causes complaints of "too warm," "not cold enough," etc.

The sealed unit must be replaced to remedy trouble caused by erratic plunger action. Warning: Do not cut open any part of the sealed unit in an attempt to make repairs as this will void the warranty.

Checking the Primary Transfer Plate Temperature

The primary transfer plate is bolted to the secondary transfer plate as explained previously. The cooling action in the primary plate is transmitted by conduction to the secondary transfer plate. When operating normally, the primary transfer plate rapidly drops in temperature as soon as the secondary control cuts in and closes the magnetic restrictor circuit.

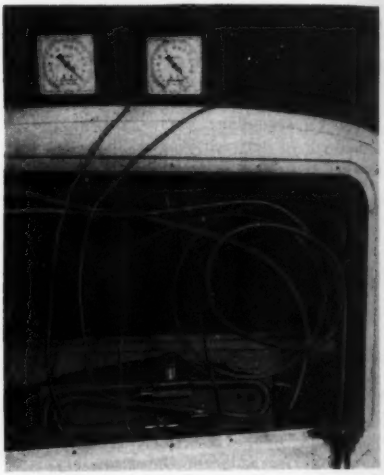


Fig. 10—Checking the primary plate.

The operating temperature of the primary transfer plate is influenced by various conditions such as the load in the food compartment, the prevailing air temperature, etc. For this reason, the actual temperature of the primary transfer plate is not always a reliable means of checking for correct operation. There is, however, a simple method of checking the cooling action in the primary transfer plate which is made in the following manner:

1. Attach the bulbs of two remote-reading thermometers (either dial or recording type) to the top and bottom transfer plate tubes exactly as illustrated in Fig. 10. It is absolutely essential that the two thermometers be accurately calibrated. The accuracy of the test depends entirely on the reliability of the two instruments.

2. Place one of the smaller insulating pads between the locker and the secondary control tube to make sure that it is well insulated from the locker. Replace the rear cover to avoid moisture penetration.

3. Turn the secondary control to "N" and the primary (locker) control all the way to the right. (This will cause the unit to run continuously.)

4. Start up the refrigerator and observe the temperature readings over several secondary cycles. When the secondary control cuts in, (the control can be heard to click on) the temperature of the top tube will immediately start to go down and within two minutes the temperature readings of both thermometers should be nearly equal, irrespective of the actual temperatures reached. If primary plate temperature does not cycle, check restrictor as previously instructed.

5. If a temperature balance within 5 F. is not reached within two minutes after the secondary control cuts in, the restrictor is by-passing too much refrigerant. This starves the primary plate.

When the restrictor allows too much refrigerant to by-pass the primary plate, insufficient cooling in the secondary system results. To compensate for a condition of this kind, the user may turn the locker control all the way to the right in order to keep the unit running and maintain satisfactory temperature in the food compartment. A complaint "refrigerator runs too much" or "refrigerator runs all the time," usually results.

Checking the Secondary System Operating Temperature

Under normal operating conditions, the cooling action in the secondary system causes moisture condensation on the back and side walls of the food compartment. The condensate will usually show a pattern of the secondary tubing which is attached to the outside of the compartment liner. The presence of moisture on the back and side walls of the compartment indicates that the secondary system is functioning and providing at least some refrigeration. (Refrigeration is also provided by direct conduction between the locker and the top of the food compartment.) To check operating temperature of the secondary system, proceed as follows:

1. Attach the bulb of a remote-reading thermometer to the food compartment side wall; a convenient method is to wedge the bulb against the liner as illustrated in Fig. 11. Place the thermometer on top of the refrigerator and adjust the tube so that it clears the lock side. The thermometer bulb must be located as illustrated in Fig. 11.

2. Turn the secondary temperature control to the "N" (normal) position and the locker control all the way to the right. Close the refrigerator door and allow the refrigerator to run through several successive secondary cycles (the unit will run continuously with the locker control turned all the way on).

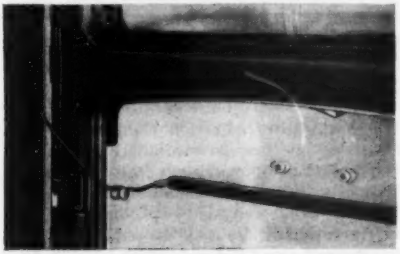


Fig. 11—Method of checking temperature of secondary system.

3. As the secondary system cycles on and off, the temperature readings should vary between 38 and 30 F. These figures are only approximate as the readings will be affected by both the food compartment load and the air temperature in the room.

4. If the secondary fails to cycle, note the temperature reading obtained after the refrigerator has been operating approximately 10 minutes with the door closed.

If the temperature reading has dropped to a low value, (below the normal cut-out temperature) the secondary system is in operation but is not cycling. A condition of this kind indicates defective operation of either the restrictor or the secondary control. Refer to previous instructions on testing the restrictor and checking the secondary temperature control.

If the temperature reading is high and has not dropped appreciably during the first ten minutes of operation, the secondary system is not operating. This condition may be due to a failure in the secondary system itself or to any condition which prevents refrigeration in the primary transfer plate. To test the secondary system, proceed as directed below. To test the refrigerating action in the primary transfer plate, proceed as directed previously.

The secondary system may be checked by means of a very simple test which is performed with the refrigerator turned off. As

explained, the secondary is a closed system and cools the food compartment when circulation is established by cooling the transfer plate. In a system of this type, the circulation is upward from the bottom, and as the Freon circulates throughout the secondary system, a slight temperature gradiant is established, the Freon being warmest in the uppermost coil of the system.

To check the circulation in the secondary system, connect a thermometer bulb to the food compartment liner as illustrated in Fig. 11. Wring out a cloth in hot water and hold it against the liner at a point about ⅓ of the way up from the bottom. The heat in the warm cloth will cause the secondary charge to circulate, and as the heat is carried upward, the thermometer reading will start to climb. Normally the secondary system responds very quickly to this test and if no increase in temperature reading is noted within 10 or 15 seconds after applying the hot cloth, it may be assumed that the secondary is inoperative.

CALIFORNIA GROUP REPORTS ON ICE CREAM EQUIPMENT LAW

ACCORDING to a report from the California Refrigeration Contractors Assoc., the new law governing ice cream refrigeration equipment went into effect Sept. 19th. It forbids any manufacturer or distributor of frozen dairy products to sell refrigeration at less than the published manufacturers' retail list price. The law, being a part of the Agricultural Code of the state, will be administered by the Market Enforcement Division of the Agriculture Dept. Under the Act, the Department is to undertake a survey, setting up new rental schedules for equipment rented to ice cream customers.

Secretary-Manager of the Association and one member of the special committee handling this work attended the quarterly meeting of the Dairy Institute at Eureka on Aug. 21st, and participated in a round table discussion of the new law led by W. B. Woodburn, Chief of the Market Enforcement Division and representatives of various dairy and ice cream interests, including the Dairy Institute. Sectional meetings are now being held at several points in the State with the ice cream industry, the Dairy Institute and the Dept. of Agriculture to further discuss application of the new law.

N.A.R.C. REPORTS TWO MORE LOCAL AFFILIATES

TWO more associations have joined the National Association of Refrigeration Contractors, bringing the total of such affiliated groups to 23.

One is the Refrigeration Dealers and Contractors Association of Fresno, California with 15 members. President is Chas. G. Bell of Bell, Hughes & Knowles; vice-president, John Geringer of Conditioned Air & Refrigeration Co.; secretary-treasurer, G. J. Neill of Arctic Refrigeration Co., 4190 Belmont, the present headquarters of the association.

The other is the Refrigeration Contractors Association of Sacramento Valley, California, with 15 members. President is A. M. MacLennan of MacLennan Co.; vice-president, A. Schoen of Al Schoen Air Conditioning & Refrigeration Co.; secretary-treasurer, S. A. Peterson of P & S Refrigeration Equipment Co.; Sergeant-at-Arms, Cliff Stewart of Refrigeration Engineering Co.; executive-secretary, Richard J. Jacinto, with offices at 1012 J St.

The west-coast is now the best organized section in the country with seven NARC affiliated associations. Headquarters of the other five are in San Diego, Los Angeles, San Francisco, Portland and Seattle.

S S S

ALL INDUSTRY SHOW HOURS

MONDAY, JANUARY 26

10 a.m. to 2 p.m.—Wholesalers only.

2 p.m. to 10 p.m.—Open to entire industry.

TUESDAY, JANUARY 27

12 Noon to 9 p.m.—Open only to Refrigeration Contractors, Dealers, and Service Engineers.

Though contractors and service engineers have been invited to attend on all four days, Tuesday has been set aside for them exclusively.

WEDNESDAY, JANUARY 28

12 Noon to 6 p.m.—Open to entire industry.

THURSDAY, JANUARY 29

10 a.m. to 4 p.m.—Open to entire industry.

The show will not be open to the general public. Only members of the trade will be admitted and each visitor should have a business card or letterhead showing the name and address of the company he represents.

Public Utility Men Discuss

The Heat Pump in Chicago

IN A talk given recently before the Chicago Section of the American Society of Refrigerating Engineers, G. G. Freyder and G. D. Weatherbee of the Commonwealth Edison Co., discussed potentialities and problems of the heat pump in the Chicago area or any area with a climate involving similar winter heat loads.

G. G. Freyder opened the discussion with a few statistics on existing installations. "A recent survey," he stated, "reveals that there are approximately 160 heat pump installations in this country. Most of them are located in mild climates and extract heat from the outdoor air or from well water. Seventy percent of the installations are in Southern California. There the heat source is no problem and the heating and cooling loads are about equal. The largest installation is in an office building in New Haven, Conn. The system includes eight 40 hp. refrigerating units. Heat is extracted from well water.

"Using well water and the outdoor air seems impractical in the Chicago climate because of severe winter weather when temperatures are near zero for days at a time and because of the problem of obtaining and disposing of well water. There are, however, two experimental installations in Muncie, Indiana, and Indianapolis, Indiana, which have stimulated interest in the heat pump in this area. One extracts heat from the earth by means of circulating water in pipes extending into a well, the other absorbs heat from the ground by burying coils in the ground. These two installations in Indiana have aroused so much interest and speculation in the use of the ground as a source of heat, that others are experimenting with this idea.

"To date there is no available reliable data for determining the size and depth of a well or the size and amount of piping that should be buried in the ground. To become better informed, the Commonwealth Edison Company is participating in a research project on heat pump systems. One is the well type, the other two are buried coil systems. The heat extracted from the earth will not be used to heat a building but will be accurately measured to determine the amount of heat that can be taken from the ground by these various methods. The installation has just been recently completed so that it can be operated during the coming heating season and obtain data for estimating purposes."

G. D. Weatherbee, Refrigeration Engineer of Commonwealth Edison Co., took up the discussion at this point, drawing attention to the fact that the only thing new about the heat pump is operating a conventional refrigerating system at a condensing temperature sufficiently high to provide useful heat. He then pointed out that the principal problem is "where can we get a source of heat at a temperature level which will make the heat pump economically practical."

"This discussion," said Mr. Weatherbee, "concerns itself primarily with heat pumps in Chicago or at least in regions with a heating season in the neighborhood of 6,500 degree days. It also concerns itself only with single family residential dwellings. For illustrative purposes, a dwelling with a net annual heat loss of about 140,000,000 has been assumed. To heat this residence, a 5 hp. condensing unit has been assumed, because calculations indicate that equipment of this capacity might be successful.

Air Volume

"Inasmuch as one reason for heating with a heat pump is that the same equipment will be used for both winter heating and summer cooling, there will probably be a finned coil in an enclosure in the basement. In the winter, it will be the condenser of the refrigerating system and in the summer, it will be the evaporator. Air from the house will be forced across this coil with a fan, distributed in ducts to the various rooms, discharged into the rooms through supply grilles, removed from the rooms through return grilles, and thence be brought back to the coil through return ducts for re-use.

"With a refrigerating system, a condensing temperature of 130 F is about as high as most engineers would want to go, at least with single stage compression. With this limit and a reasonably sized heating

coil (condenser), an air discharge temperature of 110 F would probably be good design; that is, the air would be heated only 40 F. This means that fans, ducts and grilles would have to be designed accordingly.

Cop

"The term 'coefficient of performance' as used in refrigeration is the ratio of the heat of refrigeration to the heat equivalent of power input. Thus a system with a refrigerating capacity of 6,826 Btu per hr. driven by a motor using an electrical equivalent of 3,413 Btu per hr. (1 kw) would be said to have a coefficient of performance of '2'. In the case of a heat pump, however, we say it has a coefficient of performance of '3' because both the heat of refrigeration and the heat equivalent of the electrical energy are useful. This ratio is commonly abbreviated to 'COP' and is the ratio of the heat of refrigeration plus the heat equivalent of the electrical energy to the heat equivalent of the electrical energy or,

$$\text{COP} = \frac{\text{hr} \qquad \text{he}}{\text{he}}$$

Thus a COP of less than unity is impossible. It will also be noted that the heat pump COP is always greater by 1 than the refrigeration COP as we are accustomed to think of it.

Condensing Unit

"Although the discharge temperature of 130 F corresponding to Freon 12 at 180 psi is somewhat higher than that encountered in usual applications, it is not much higher than sometimes results when a condenser is air cooled. The compression ratio is well within the limit of single-stage Freon 12 machines without materially affecting efficiency according to some compressor designers who believe it is doubtful whether the efficiency could be improved appreciably by a re-design for heat pump application. They believe that a higher COP depends more upon the design of the system than upon the compressor design; that is, liberal heat transfer surfaces and maximum liquid subcooling.

"In spite of these statements, however, we know that the knowledge already exists regarding how to improve the operating characteristics of both motors and compressors beyond their present commercial limitations. When the heat pump market becomes sufficiently attractive to manufacturers and competitive influences begin to exert themselves, there is very little question that a COP of 3½ or more will be obtainable.

"To heat our typical small residence on a day when the mean temperature is 5 F (60 degree days), a capacity of about 48,000 Btu hr would be required. In January 1945, there were only 3 days colder. Reference to typical performance data indicates that if the suction temperature was maintained at 15 F (17.7 psi), this condensing unit would barely do the job without anything left over. There would be no reserve whatever for 'pick up' and a resort to auxiliary heating might be necessary for the sub-zero days involved.

Heat Sources

"A number of possible heat sources for residential heat pumps can be imagined.

"First, there are streams or large bodies of water which do not freeze. An evaporator designed for a 7 degree TD immersed in 32 F water would permit operation at the 25 F suction temperature level. However, so few homes are adjacent to such a heat source that it can be disregarded, particularly in Chicago.

"Second, there is well water pumped and wasted. If 50 F water were available in winter and were cooled 35 F, it would permit operation at the 25 F suction temperature level or higher. However, if a refrigerating capacity of say 40,400 Btu per hr. were maintained, 5½ gallons per minute would have to be pumped and involve a considerable pumping cost in addition to the cost of the well. Disposal of the cooled water would also present a problem if very many such jobs were involved. Well water as a source of heat would be practical only in limited instances in the Chicago area.

"Third, there is city water, but city water in Chicago need not even be discussed. Being only 3 or 4 degrees above freezing during the winter months, its use as a source of heat is obviously out of the question.

Heat from Atmosphere

"Fourth, there is the atmosphere. Reference to Weather Bureau data shows that the atmosphere was 35 F or warmer during 170 days of the 261 days in 1944-45 when heat was required. With an atmospheric evaporator with a 10 degree TD design, a heat pump could have operated at the 25 F

suction temperature level or higher 65% of the time. It was 25 F or warmer 217 days out of the 261 total. With the same evaporator, a heat pump could have operated at the 15 F suction temperature level or higher 83% of the time. But what about the other 44 days, especially those around 0 F? That is where the atmosphere as a source of heat fails.

"On a 30 F day, our 5 hp. condensing unit would operate only 50% of the time; on a 15 F day 100% of the time; and on a 0 F day, it would have only half the capacity needed to heat the house.

"With an atmospheric evaporator, the problem of frost accumulation will always be present.

"Fifth, it has been mentioned that household refrigerators and home freezers be used as a heat source. Without considering the small amount of heat available, the mechanical complications and temperature control difficulties, it should be remembered that no net heat whatever could be realized from either of these items if they were located within the residence to be heated.

Heat from the Earth

"Sixth, there is the earth which seems to be our last resort in the climate. The earth gets colder in winter and warmer in summer but at depths of two feet or more, the change is gradual and is not sharply fluctuating from day to day like the atmosphere.

"A small home in Indianapolis has been heated by tubing buried in the earth for two winters and has received quite a lot of publicity.

"It appears that the size of the pipes, the spacing of the pipes, the kind of soil, the wetness of the soil and the proximity to the surface will introduce a maze of variables. With "K" factors for soils varying from 0.1 to 2.4 according to their composition and particularly according to their moisture content, a consistency of results appears to be impossible. The degree of continuity of the heat drain depending upon the hours of operation will also be a factor.

"In Chicago, there are three principal types of soil, each of which will have to be investigated as a heat source. On the west side, there is clay; on the east at varying distances from the lake, there is sand; and in certain areas, there is 'fill' consisting largely of ashes. There is yet no reliable data to prove whether pipes buried in these different types of soils would or would not absorb comparable amounts of heat.

"An interesting variation of the earth coil arrangement is the use of a deep well from which no water is pumped. Two pipes are placed in the well casing and connected by a return bend at the bottom to form a closed circuit with a water pump and a water chiller. The circulated water absorbs heat from the earth surrounding the well and the heat is delivered to the heat pump through the chiller. A few small residences have been successfully heated in this manner according to reports.

Specific Values

"Probably the most reliable data available was published in the June issue of Heating, Piping and Air Conditioning giving the conclusions of Prof. R. A. Budenholzer as a result of recent research at the Armour Research Foundation. An extract from this article is quoted:

'These studies have revealed the fact that a ¾" OD or larger coil buried 2 or 3 feet below the average frost line will serve satisfactorily (as a source of heat), provided sufficient length of coil and proper spacing are employed to prevent excessively low refrigerant temperature inside the coil during the heating season. The study has indicated that when using this size coil in a soil having a thermal conductivity around 1 Btu per sq. ft. per hour per F per ft. of thickness, the following rule will hold approximately 1 F below the surrounding uniform soil temperature for every Btu withdrawn per hour per linear foot or coil exposed to the ground. In other words, if the average load on a certain coil buried at a depth of 6 feet is 30 Btu per linear foot per hour, and if the average temperature of the soil is 50 F, the average temperature of the evaporating refrigerant during the heating season would be approximately 50 minus 30, or 20 F.'

"At the present time, no one is in a position to question this statement regarding the flow of heat into buried pipes. It must be regarded as a major contribution to this new field of research. Being based as it is upon actual experimentation in a very fine laboratory, the conclusions must be accepted as correct for that particular system of buried pipes. But the question still remains, what if pipes of a different size were arranged differently in a different kind of earth with a different moisture content and the refrigerating system were operated at a different degree of continuity?"

SERVICE POINTERS

A department for the exchange of ideas on new devices and methods of improving service work. Five dollars is paid for each pointer published. Write up your idea today and mail it to the Service Pointer Editor.

DOPING THREADS ON FITTINGS

I HAVE found innumerable cases of flare fittings leaking after they had been in operation for some time, due to moisture drawing into the threads and freezing. This is especially true where the fixture is operated on a defrost cycle. I have even had new fittings loosen up.

The first case I had of this was on a low side Frigidaire coil. The gasket would only hold about 30 days and then start leaking. After the third gasket went out, I removed the coil so I could examine it more closely. The only thing I could find wrong was the bolt holes seemed slightly enlarged. I put on a new gasket, doped the threads and never had any more trouble.

After installing a new valve on a reach-in box I lost two charges of gas before I realized what was happening. The first time I thought perhaps I had failed to tighten the nut securely. I now have a rule that I always follow. If there is apt to be any frost, put on a frost proof nut and dope the threads. Care must be taken, however, not to get any dope on the face of the flare as it is apt to get in the system and cause trouble. I use gasola, but there are probably many other thread pastes that would work as well.—*Submitted by Howard Muck, Wichita, Kansas.*

WATCH THAT LOCK SCREW

THIS suggestion may be old but for one who has not had the experience, it may save time and parts.

I was called to repair a motor on a deep freeze unit that the front bearing had gone out. I unscrewed the Allen set screw and put a gear puller on, but the pulley did not move. After damaging the pulley I discovered there were two set screws in the same hole—one under the one I loosened. If you have trouble taking a pulley off, see if there is a lock screw over the one that holds the pulley on the shaft.—*Submitted by Elmer J. Scherer, Cicero, Ind.*

REPAIRING BROKEN DRILL BITS

WHEN a drill shank breaks off too short for gripping in a chuck, a satisfactory repair can be made in the following manner.

Cut a piece of steel rod about the same diameter as the drill and to the length required. Grind the broken end of the drill and the end of the steel rod flat so the two will butt together as tightly as possible. Cut a piece of copper tubing of the nearest size to the drill, about one inch long and slip it over the joint between the steel rod and drill. If this tube is too large, split it lengthwise and squeeze it closed to fit tightly around the joint. Mount the assembled joint in a piece of angle iron to hold it in line, then silver solder. The strength of such a splice is surprising.

STARTING A NUT

WHEN the end of a bolt has been burred and no die is available to clear the thread, try starting the nut by first making a saw cut in the end of the bolt a short distance down the thread. Carefully squeeze the end of the bolt together, closing the cut, then try the nut. Incidentally, after the nut is in position this saw cut can be used as a very good locking device. Just spread the cut in the end of the bolt with a screw driver or small chisel and the nut will not work off. Turning it off with a wrench, however, will again compress the saw cut.

DEMONSTRATING A FREEZER

HERE is a spectacular little sales demonstration for those who are selling home and farm freezers. Keep a loaf of sliced white bread frozen in your displayed model. On the top or near by, have a toaster ready for business. Then when your lady

customer comes in, just escort her over to the freezer. Take out one frozen slice of the white bread—tap it against the toaster to show how hard it is—then drop it in the toaster. Switch on the toaster and believe it or not the toast comes out perfect—so perfect the lady will hardly believe it. This is one way to dramatize the advantage of a home freezer.

S S S

BUSHING FOR FLARE BLOCK

FOR some time now, whenever I read a kink someone has sent in, I tell myself I'm going to send in one of my ideas that saved the day for me sometime ago, but never got to it. Well, here it is now and it works.

Whenever there is need of a flare on 3/16" tubing and a flare block with this size opening is not available, an ordinary flare block with a 1/4" opening may be used as follows: Secure an old piece of sheet lead or similar material (everyone has an old lead gasket on hand), cut out a piece approximately 1/2" x 3/4", wrap this around the end of the tube to be flared and lead should be flush with end of tube. Then insert in flare block in the usual manner and proceed to flare the tube. The lead around the tube makes up the difference so a 1/4" block hole will take it. The grippers in the block bite into the lead and secure it. The lead extending out of the block with the tube end forms a seat when the flare is formed.—*Submitted by Phillip J. Reuter, Trenton, N. J.*

S S S

NEUTRALIZING SO_2

AMMONIA can be used to neutralize SO_2 gas leaks. The reaction of these two gases will form a white precipitate but this will settle out leaving no trace of SO_2. When we were in the service business, many years ago, each of our servicemen carried a small drum with a steel valve and filled with 5 or 6 lbs. of ammonia, enough to neutralize a large amount of SO_2 gas. We used this ammonia many times in cases of SO_2 gas leaks, making it possible to work in a building almost immediately after a leak. This is a valuable service especially to commercial customers. *Caution:* Don't release more ammonia than is necessary to neutralize the SO_2 present or you'll still be in trouble.—*From "The Liquid Line."*

"MISSION COMPLETED—SHALL I COME IN?"

Make Sure This Display is on Your Wholesaler's Counter . . . . .

Now USE these New (AP) Valves...

for ALL TEMPERATURES... Low, Commercial, or Air Conditioning

• *Install these two new A-P Thermostatic Expansion Valves WHEREVER A PRESSURE LIMITING FEATURE IS DESIRABLE . . . on every system showing any possibility of overload. You'll save service and repair time, and even motor breakdown by their prompt use. Like all A-P Expansion Valves, the new Model 211 (Fixed Superheat) and Model 212 (Adjustable Superheat) can be installed in any position, any location, any ambient temperature without affecting control accuracy. Put these two new A-P DEPENDABLE Valves to work — for your profit, and for your customers' satisfaction. Ask your wholesaler for operating and application details.*

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(AP) Dependable REFRIGERANT VALVES

QUESTIONS and ANSWERS

On Problems of Servicing and Installation of Refrigerating Equipment—Send Your Problems to the Question Box.

COMMENTS ON QUESTIONS

REFERENCE TO QUESTION 804: I, too, had trouble with a Crosley capillary tube job recently. The symptoms were identical with his except at times the evaporator would completely defrost and I could seldom pull a vacuum although the compressor would pump a 28" vacuum off the system. After much experimenting with blowing and washing out with carbon tet., I put on a new evaporator and never had any more trouble.

I decided to see if I could clean the old evaporator by pumping a cleaning compound through it with a small pump, then blew it out with air and dried it in an oven under vacuum. After I put it on the unit it still frosted slowly so I cut it open in several places and every port and channel was still packed with carbon.

You can burn carbon out of an old stove but not out of an evaporator, so my advice to save money and time is to junk the old evaporator.—*Eugene Overby, Harrisburg, Ill.*

AERATOR UNDER-POWERED

QUESTION 810: I am confronted with a problem which I know you are able to solve. I installed a direct expansion system to a milk aerator in a dairy where the owner started to pasteurize. My trouble is that I cannot pull the temperature down low enough. I can only pull the temperature of the milk down about 18 degrees. The milk hits the top of the aerator at 143 degrees F. and is cooled by water to approximately 68 degrees F. when it hits the "Freon 12" portion of the aerator which only cools it to about 50 degrees, thus the "Freon" part of the aerator only draws 18 degrees.

The salesman who sold the pasteurizing outfit said that a one horsepower condensing unit would do the job, but I thought that he was a little low so I installed a 1½ hp. water cooled condensing unit, and I think I am still too low. The milk should be cooled to about 45 F. I recommended a 3 hp. water cooled condensing unit. Am I right? The aerator or cooler was installed by the Girton Co. The aerator is 4 ft. long and has 24 one inch pipes. The upper 12 pipes are water cooled and the lower 12 pipes to be "Freon-12" cooled. The dairyman bought this outfit for a capacity of 1200 pounds of milk per hour. It is powered by a Red Dragon condensing unit 1½ hp. Universal compressor and Wagner motor.

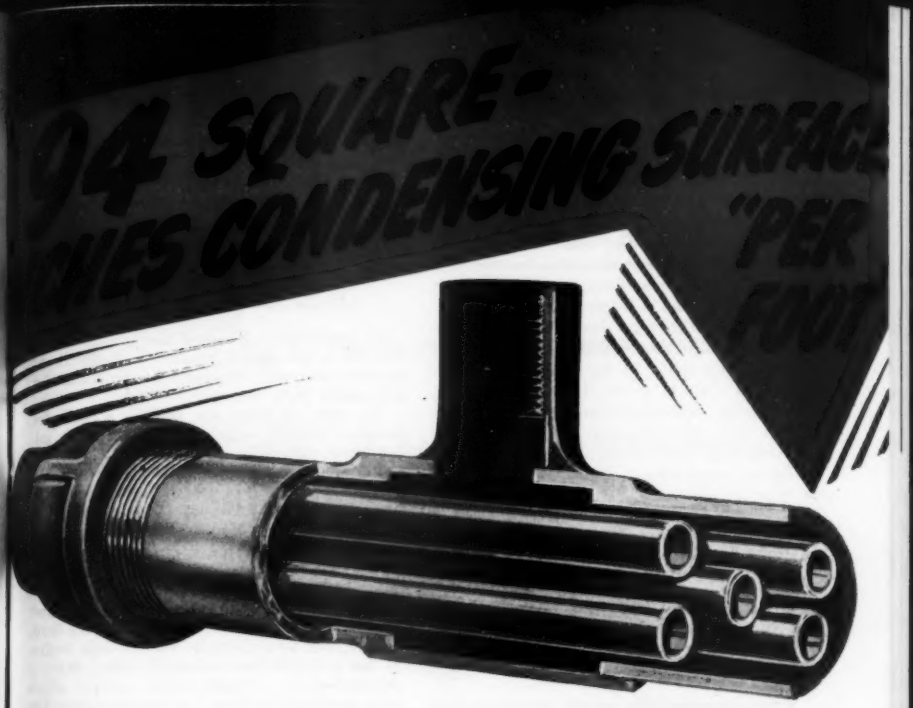
Here is what happens when I start the condensing unit. In about 5 minutes the aerator or cooler freezes up good and frosty until they turn the milk on, then it simply knocks the frost all off and the suction pressure goes up to from 34 to 38 lbs. I have tried to change the super-heat on the expansion valve. I can bring the suction pressure down but with no results. Do you think changing the liquid line and the suction line vice versa would be of any benefit? Do you think a 2 ton automatic expansion would work better? We have a full charge of "Freon-12" in the unit.

ANSWER: Your farmer customer wants to cool 1200 pounds of milk per hour from 143 degrees F. down to 45 degrees F. Twenty-three degrees of this temperature drop will be by direct expansion refrigeration—or in other words, the water cooled section brings the temperature down to 68 degrees and the refrigerated section brings the temperature from 68 degrees down to 45, a difference of 23 degrees.

Twelve hundred pounds of milk per hour, cooled 23 degrees will require a condensing unit with a capacity of 27,600 Btu. per hour. This is a great variation from the recommendations made by the salesman whom you stated recommended a one horsepower unit.

The 1½ hp. unit you have installed will have a capacity of about 16,000 Btu. per hour, and a 2 hp. unit a capacity of 21,000 Btu. per hour, therefore a comparison between these figures and your required capacity indicates that a 3 hp. unit with a Btu. capacity of 31,000 will be required.

I would suggest, too, that you get in touch with the manufacturers of the aerator and check its capacity. According to my figures, the aerator you have described is capable of handling only 1,000 pounds of milk per hour and you should have a 36-tube, 4 ft.

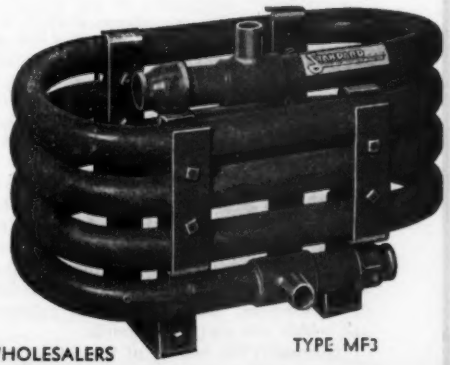


HIGH capacity per unit foot means less condenser length. The maximum heat transfer is a design feature of STANDARD MF condensers. Note the cut-away *heat exchanger tee* showing multiple tube construction.

All Type MF condensers contain a cluster of parallel tubes terminating in a brazed header at the *heat exchanger tees*. This assures long service-life and accessibility for cleaning.

Five multiple half-inch copper tubes are used in the MF 3 and 5 condensers. Smaller sizes are built with three tubes—larger sizes up to 15 tons rating are built with nine tubes, providing greater capacity with minimum space requirements.

All STANDARD Condensers are listed under Underwriters' Laboratories Re-examination Service.



TYPE MF3

SOLD THROUGH LEADING REFRIGERATION WHOLESALERS

Standard Refrigeration Co.

20 North Wacker Drive — Chicago 6, Illinois

wide aerator to do the job the farmer requires.

With this increased capacity of a 3 hp. condensing unit you would need a 2 ton expansion valve and the system should be adjusted to operate on a 30 to 35 degree suction pressure. Refrigerant flow should be counter-flow to the milk, or in other words, the refrigerant should enter the bottom of the aerator while the suction is taken off the top of the refrigerated section.

Because of the wide discrepancy between the salesman's calculations on this job and the capacity required to handle the work the farmer wants to do, there would seem to be some misunderstanding between the farmer and the salesman. It doesn't seem possible that such a large error could be made in calculation.

ANALYSIS OF SLUDGE

QUESTION 811: Enclosed you will find a sample of a substance which I removed from a strainer in a Frigidaire water cooler. The strainer was located in the cylinder block of the compressor and it was plugged solid. There is also a strainer just after the liquid receiver, which is not as fine, but it was very clean.

When I removed the sample substance from the strainer it was a light gray color, and was rather hard.

The refrigerant used in the system was F-12. I do not know if at any time in the past any methyl chloride or any other refrigerant was ever used in the system. Please tell me what the substance is, what caused it, and why the strainer just after the liquid receiver didn't catch any of it.

Incidentally, the inside of the crankcase was coated with a white substance which was very hard to remove. As a matter of fact the only way I could remove it was by using steel wool.

ANSWER: The sample of sludge referred to was forwarded to Dr. Walter O. Walker, Director of Research and Development, Ansul Chemical Co. His analysis follows:

"This deposit consisted essentially of iron chloride and is not contaminated with other products. Iron chloride is the result of the action of moisture on the refrigerant in the system, resulting in the production of hydrochloric acid which in turn acts on the iron of the machine. This produces the yellowish salt which you sent as a sample.

"Normally, the finding of iron chloride in a unit would mean that moisture had not been in it any great length of time, certainly not more than a few months, otherwise this chemical substance would have deteriorated into a plain rust of the oxide type.

"About all you can do in connection with a machine which is contaminated with a material of this type is to keep a strainer in the line so that difficulty is not encountered at the expansion valve. If there is sufficient of this salt in the unit to stick the compressor, then an overhauling job is the only recourse."

MILLS ICE CREAM FREEZER

QUESTION 812: I would like some information on a job that I am doing that will not operate correctly. It would be appreciated if you could help me out.

To start off with, the unit is a Mills Ice Cream Freezer, a 2½ gal. with a 40 gal. hardener. The freezer model is R250040, 220 volts, 6.6 amps., 60 cycle, Phase 1, Ser. No. A1621. The compressor model is MG3A29, Ser. No. 6620, Air cooled — Refrigerant CH_3CL 15 lbs.—60 cycle, Phase 1, 220 volt, 12.4 amp. The motor is a Wagner 2 horsepower, 1750 rpm., 60 cycle single phase, Type RA, Model No. 2R2B598M43.

The expansion valve that feeds the freezer is a Detroit No. 674 non-adjustable, the hardener is fed by a Detroit No. 673 5-64 orifice. It has a liquid line solenoid valve, which is controlled by a temperature control which also controls the blower to the hardener. The unit is located about 15 feet from the freezer and hardener. The liquid line is ⅜ and suction line ¾. There is a sight glass located in liquid line just before a 1 ton trap-dri.

Now the complaint has been that when he makes his cream, the temperature in the hardener starts to rise. He starts off his temperature in the hardener down to hardening temperature and by the time his hardener is filled (40 gals.) the temperature rises to about 20 degrees. Also the time it took to make his cream was longer. It would take as much as 20 to 30 minutes to make 2½ gallons. What would be the cause of this?

Also when he would turn his time clock on to 11 hours, it would shut off about 3 hours before the time was up. Then it would operate intermittently until the time was up. What could be causing this? Also the blower would operate in hardener and the unit would short cycle. The unit is operated by pressure control.

I have checked the compressor for efficiency and it will pump down to 30 pounds with a 115 pound head pressure and hold. It will also pump up to 300 pounds with a 10 pound back pressure and it will hold at about 220 pounds. I have changed the liquid line solenoid valve which was leaking by on the off cycle. This has stopped the short cycling of the unit when the blower is off.

I have also installed a check valve in the suction line to the hardener to prevent the

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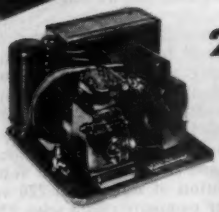
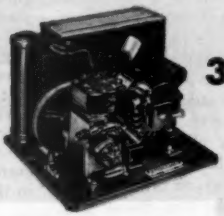


2. CONVENIENT WAREHOUSING!



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When it comes to condensing units that are precision-engineered, *quality built,* and priced to give you a competitive advantage . . . count on Kelvinator!

Dependable performance under all conditions is the result of Kelvinator's more than thirty years' experience in designing and building the finest refrigeration equipment. And for your convenience, there are 50 strategically located Kelvinator depots throughout the country. At any one of these depots you can quickly fill your needs for condensing units and obtain Kelvinator-made parts and supplies needed to make a complete installation.

For quick, friendly service, mail or phone in your order—or stop in personally . . . Kelvinator, Division of Nash-Kelvinator Corp., Detroit, Mich.

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Order from this big, new, illustrated catalogue! Parts numbers, specifications and prices are grouped for ready reference. Ask for it at your nearest Kelvinator Distributor's or Zone Office.

Kelvinator

CONDENSING UNITS
REFRIGERATION PARTS AND SUPPLIES

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hot gases from the freezer from going to the hardener when he is making cream. He still claims that his temperature rises in the hardener when he is making cream. What could cause this trouble?

The operating head pressure is 115 pounds with a back pressure of 15 inches, room temperature of 75 degrees. The liquid line sight glass is clear. I have also checked the system for leaks and it is OK.

ANSWER: After reading the conditions outlined, we would judge that the hardener warms up because it takes so long to make ice cream in the mixer. The cabinet temperature will rise when it is filled with 26 degree cream, but apparently the compressor is operating so inefficiently on the mixer head that very little time is spent between batches pulling on the cabinet coil. Under normal conditions, it would be possible to freeze a batch of cream in the mixer in from 3½ to 6 minutes.

The most common cause for slow freezing is a shortage of refrigerant. You may test this by removing the agitator and opening the main refrigeration valve. The freezer cylinder should frost over completely from top to bottom in 1 minute or less. If the cylinder frosts only half way, or takes longer than 1 minute to reach the top, there is a shortage of refrigerant or a restriction in the expansion valve or liquid line. While freezing ice cream, the back pressure should work from 7 pounds down to about 3 pounds, and the frost line should extend a few feet past the hand valve.

A leaking check valve would allow liquid refrigerant to by-pass the expansion valve and allow liquid refrigerant to flood over into the suction line and compressor base. If the back pressure stays up and the pump apparently does no work, the small cone-shaped screen underneath the suction service valve may be restricted. Then there is the possibility that the compressor may have a broken suction reed and be running on one cylinder.

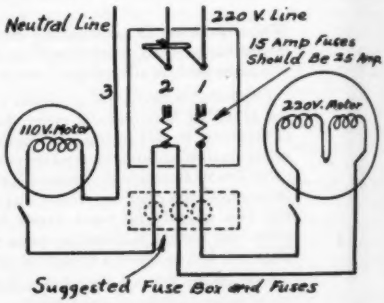
The low pressure control should be set to cut on at zero pounds pressure, cut off 18" of vacuum. As long as the clock in the cabinet is set to the hardening position, the liquid line solenoid valve stays open and the blowers operate. If the unit cuts off under these conditions, either the coil is choked with frost, or the valve is not feeding enough refrigerant.

If you find it necessary to change the mixer valve we would suggest that you use a Detroit 673 having a 5/64 orifice and a maximum operating pressure of 25 pounds. The same type of valve is recommended for the cabinet.

ELECTRIC CIRCUIT FEEDS BACK BURNS MOTOR

QUESTION 813: I would like some information on trouble that I have had in regard to the diagram shown. The start of this trouble is as follows: This set-up is in a combination small grocery store with meat case and deep freeze chest in grocery store and living quarters attached. In the store they have lights, ceiling fan and 6 ft. home refrigerator. In the living quarters—lights and two home refrigerators and plug outlets for toasters, etc. All of this was on one circuit using 30 amp. fuses.

A complaint came in that the electric bill was too high and refrigeration machinery running too long and inefficient. I recommended putting deep freeze and meat case on 220 volt line direct from entrance switch to switch box located in grocery store, thus removing two heavy loads from the house circuit and providing ample voltage for proper operation of motors on 220 volts. I had the power company run 3 wire 220-110 volt service to the place and tied on 220 volt line at entrance, running service to fuse box located in the store. Then 220 volt line to meat case.



In checking motor on deep freeze unit, I found it to be only 110 volts, so removed hot wire from store living quarters circuit and put it on one leg of 220 volt line to new switch box, leaving neutral tied in to store circuit. I changed the connections on meat case motor leads to 220 connections and turned current on. This operation continued fine for several days, then the owners were aroused about 2:00 a.m. one morning by smoke. They found the meat case motor smoking and one fuse on new switch box blown. The motor was humming as if it wanted to run but couldn't.

In checking motor after this trouble I couldn't find a short or ground, the only thing I could see was a possibility of a feed

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Recharging with Virginia Methyl Chloride is a painless way to get rid of your refrigeration troubles. "V-Meth-L" is made specifically for refrigeration purposes . . . is consistently pure. The contents of each cylinder is tested and re-tested to maintain the high quality that has made "V-Meth-L" world-renowned. Remember, the use of a good refrigerant is the first step in preventing kick-backs due to sludging, copper plating, or frozen expansion valves. VIRGINIA SMELTING COMPANY, West Norfolk, Va. *Established 1898.*

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back through the motor and neutral wire of the deep freeze unit, but this only if the temperature switch was closed and motor operating.

Could you help me out on this problem and tell me where the trouble is and correction for same? Why would current still flow through this motor with one fuse out?

ANSWER: I don't see anything wrong with your electrical hookup of the two motors on the 220 volt line except in your manner of fusing. I note that in your diagram you indicate only two 15 amp. fuses being used in the main circuit.

I assume that when this motor was found smoking that both motors had attempted to start at the same time which very likely blew out the fuse on the line I have marked (2). This, then, assuming that both temperature switches were closed, would permit a 110 volt circuit from line (1) through the 220 volt motor through the common junction of line (2), through the 110 volt motor to ground or line (3). Thus it is possible that you can obtain a 110 volt circuit through the 220 volt motor when (2) fuse is blown.

The correction to this situation, I think, is in replacing your present 15 amp. fuses with 25 or 30 amp. fuses which will give protection against direct shorts only. In addition to this there should be another fuse box with a separate circuit arranged for each motor so that each could be properly fused with fusestats.

With this arrangement it would seldom be possible for the main fuses to blow and if any one of the three motor fuses were blown it would not be possible to obtain 110 volt circuit through the 220 volt motor.

BUILDING A FREEZER

QUESTION 814: I am trying to build a frozen food storage cabinet to use myself and would appreciate your help in determining the size evaporator and condensing unit needed. The cabinet is 39" long, 57" high, 36" deep, inside having 3" of celotex insulation. I expect to use the cabinet about 12 hours a day and want to maintain 15 degrees in the cabinet. Outside temperature will be normal. Would F-12 work better than methyl chloride? Would a blower unit be better than a regular evaporator?

Another problem that has been puzzling me is preventing moisture collecting on glass. I know double glass works, but does the size of the air space matter and what is the smallest air space used? Does the thickness of the glass enter into it?

ANSWER: It is my suggestion that your cabinet be built in such a way that the tubing can be wrapped around the outside of the liner, thus using the liner itself as the fin surface of the evaporator and setting up a refrigerated wall against the entrance of heat on all sides of the storage space.

Usually these cabinets are packed fairly tight with foods, which does not permit much circulation of air around them, and it does not matter whether you use plate type evaporators or blower units, you have little chance of permitting air circulation. Furthermore, since some of the foods may come in contact with the liner, there is always the possibility of heat being conducted to the food permitting a variation in temperature of those foods next to the liner and those some distance from it.

I am of the opinion that 3" celotex insulation will not be enough for this cabinet. It should have the equivalent of at least 4" of cork which will probably mean at least 5" of celotex. Furthermore, the celotex must be thoroughly sealed against the entrance of moisture—and herein lies the most important part of your construction.

The outside of the liner wall, irrespective of what evaporator arrangement you will use, will always be a very cold surface and any possibility of moisture entering the area between the inside liner and the outside casing will add so much more condensation or frost on the inside liner. This moisture then will be absorbed by the insulation, reducing its effectiveness unless the insulation is thoroughly vapor proof.

According to the figures you have given me, you will have approximately a 45 cu. ft. cabinet, and according to my figures a ⅓ horsepower unit will handle up to 50 cubic feet of properly insulated space.

When using glass as part of the refrigerated wall, the amount of space between glass layers is not a factor. The space may be anything from 1/16", or in other words just enough to prevent the two sheets of glass from touching, up to any space required. The individual layers, however, must be thoroughly sealed against the entrance of air and moisture between the glass layers. This, coupled with sufficient layers to prevent the outside from becoming cold enough to condense moisture on it, is the secret of clearer vision through it.

For temperatures you suggest, it will be necessary to have at least three layers of glass, and you may find it necessary to go to four layers.

I don't think there should be a great deal of choice between using F-12 or methyl chloride. Either will work satisfactorily.

160 ADDED REASONS

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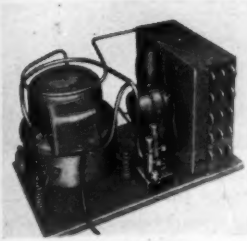
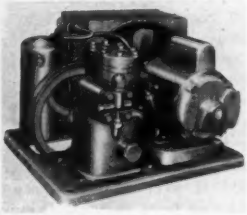
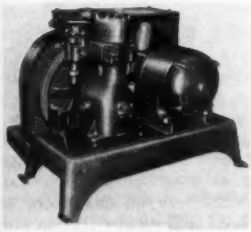


HERMETIC UNIT
⅛ H.P. to ½ H.P.



SELF-CONTAINED
1/6 H.P. to 1 H.P.



REMOTE TYPE
¼ H.P. to 15 H.P.

Yes, there are 160 ADDED REASONS for using genuine Universal Cooler replacement parts — the 160 U. C. parts jobbers strategically located throughout the United States.

One of them is within quick delivery distance, wherever you are. And when you get genuine U. C. replacement parts, your service job will be easier and the results more satisfying.

If you don't find a U. C. parts jobber listed in your phone book, we'll gladly furnish you the name of the one nearest you.

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The store front of Gas and Electric Shop, Van Nuys, California, and two of the service men on their way to make an installation of a piece of gas equipment.

Buy from the Dealer Who Maintains Your Appliance, Advertising Theme of This Shop

By BERT MERRILL

ON THE theory that appliance dealerships which consist merely of a salesroom and a stock of new appliances will fold up when the old competitive situation returns, Gas & Electric Shop of Van Nuys, California, is advertising "Buy From the Dealer Who Can Maintain Your Appliance."

Lydon McDonough, head of the shop, is convinced that wartime experience of most housewives will lead them to buy new appliances with an eye toward good maintenance. "Most of our service customers tell us that they're grateful for the good repair work we've done for them" he pointed out. "Consequently all our postwar advertising will mention complete appliance service first, and sales stock second."

With a crew of five mechanics, Gas & Electric Shop has handled from 20 to 35 service calls per day since early 1943, including refrigeration, gas appliance and radio work. Instead of merely "marking time" while awaiting the return of appliance shipments, McDonough has made service work pay a constant profit. Giving a 90 day guarantee on all work up to complete refrigerator overhauls, the firm's charges are $2.50 plus parts for each hour of shop work, and a minimum of $3 plus parts for outside home calls.

Three veteran mechanics are paid $1.50 an hour and two apprentices being trained receive 90 cents an hour. Every employe dons a clean blue uniform with the Gas & Electric Shop name on the back each morning, and repair trucks are kept spotless out on the job. Customers receive invoices which itemize every step in every repair job, emphasizing the guarantee which McDonough will actually make good long after the 90 day period is over. "With those kind of methods, we've been merchandising service" he explained, "as a good will builder which will bring immediate prospects now, and loyal friendships a few years from now."

A Cardex file has been maintained for three years in the office, which now amounts to more than a thousand names. Each lists addresses, and the appliances which the service customer wants in the future. "That's our major postwar market," McDonough summed up. "We will have three outside salesmen as soon as supplies warrant it, calling exclusively on customers who have already been sold on our service work. Combined with this we'll advertise more strongly than ever, and use it as a platform to stay in business long after non-service selling agencies have closed their doors."

\$ \$ \$

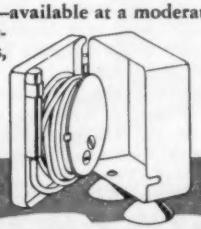
GOVERNMENT economists recently declared that within about 10 years 50 per cent of all perishable foods will be preserved by freezing. Today, though the amount of food frozen has increased 300% since prewar, only 2% is frozen.

New 4-Scale SERVICEMAN
the all-purpose thermometer

One more proof that Marsh keeps pace with your needs . . . a "Serviceman" thermometer with four scales. The illustration tells the story: Outer scale reads down to —30° F. for work on those quick-freeze units—up to +65° for the regular run of work. Other scales in differentiating colors show equivalent pressures of Freon, sulphur dioxide, and methyl chloride. So you have here the all-'round, all-purpose instrument.

All the features that have made the "Serviceman" so popular have been retained and still more highly developed. This is reflected in the bright chromium bezel which makes an effective contrast with the satin-black finish of the case. Neatly concealed in the case when not in use, is five feet of sturdy tubing, slender enough to pass between the gasket and jamb of a closed refrigerator door. Movement is guaranteed accurate within one degree and has the famous Marsh "Recalibrator" to keep it accurate. Suction cups prevent slipping on irregular surfaces and protect all finishes.

Down to the last detail this is a quality instrument—available at a moderate price that makes it a remarkable value. The serviceman is also available in standard scales and ranges, —30° F. to +65° F. and —10° F. to + 100° F.



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NEWS and ACTIVITIES

Announcements of the activities and educational work of the International Society and Local Chapters appear in this department.

COMING CONVENTIONS

RSES Annual Convention
Place: Hollenden Hotel
City: Cleveland, Ohio
Date: Jan. 21, 22, 23, 24, 1948
Secretary: H. T. McDermott, 433 N. Waller Ave., Chicago 44, Ill.

R.E.M.A.—All-Industry Exposition
Place: Cleveland Public Auditorium
City: Cleveland, Ohio
Date: January 26-29, incl., 1948
Secretary: R. Kennedy Hanson, 1107 Clark Bldg., Pittsburgh, Pennsylvania

Interprovincial Association
Place: King Edward Hotel
City: Toronto, Ont.
Date: March 9, 10, 1948
Secretary: E. G. McCracken, 215 Laird Drive, Leaside, Ontario.

California State Association
Place: Palace Hotel
City: San Francisco, Calif.
Date: April 30, May 1 and 2
Chairman: David Fagg, 1951 E. 14th St., Oakland, California

VIRGINIA STATE ASSOCIATION

AFTER several meetings of the Virginia chapters, called by International Director Walter E. Booth of Richmond, Va., definite plans have been formulated for the establishment of the Virginia State Association of the R.S.E.S.

At a meeting held in Richmond, Va., on October 11-12, the following officers were accepted for the term ending June 30, 1948: W. E. Booth, Richmond, *President;* E. Zepkin, Newport News, *Vice-President* and Chairman of the Educational Board; Paul Bruffey, Richmond, *Vice-President* and Chairman of the Committee on Standards; A. Hauck, Richmond, *Vice-President* and Chairman, Codes and Ethics; R. Lampie, Richmond, *Vice-President* and Chairman of Public Relations, Publicity and Advertising; H. S. Beumer, Roanoke, *Sergeant-at-Arms;* M. L. Parker, Denbigh, *Secretary-Treasurer.* To complete the formative details of the association, the president appointed the following committees:

Constitution and By-Laws Committee. Chairman, J. G. Hudgins, Tidewater Chapter; W. G. Andrews, Blue Ridge Chapter; G. Blount, Peninsula Chapter; B. A. Hauck, Virginia Chapter.

Legal Affairs Committee: Chairman, W. G. Andrews, Blue Ridge Chapter; T. S. Bannard, Tidewater Chapter; E. Zepkin, Peninsula Chapter; R. W. Lampie, Virginia Chapter.

Ways and Means Committee: Chairman, George Holder, Blue Ridge Chapter; J. P. Bussey, Tidewater Chapter; M. L. Parker, Peninsula Chapter; P. B. Bruffey, Virginia Chapter.

Membership Committee: Chairman, P. B. Bruffey, Virginia Chapter; K. U. Higgie, Tidewater Chapter; H. S. Beumer, Blue Ridge Chapter.

Attending the meeting of October 11-12 were the following representatives from the participating chapters: From Tidewater Chapter—J. G. Hudgins, T. S. Bannard, K. U. Higgie, J. P. Bussey, H. T. Norris, and E. J. Hanson. From Blue Ridge Chapter—H. S. Beumer, G. Holder, and W. G. Andrews. From Virginia Chapter—W. E. Booth, B. A. Hauck, R. W. Lampie, and P. B. Bruffey.

The next meeting of the State Association has been called for November 15-16 at the Monticello Hotel, Norfolk, Va.

TREASURER DOYLE—PROUD "PAPPY"

JOHN WILLIAM DOYLE, a future service engineer, was born October 20 in Omaha, Nebr. Parents are Mr. and Mrs. Clem J. Doyle, 4339 California Street, Omaha 1, Nebr. Papa Doyle is the International Treasurer of the Refrigeration Service Engineers Society.

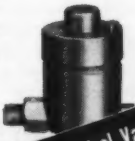
Temprite ACCESSORIES CUT OPERATING COSTS AND INCREASE EFFICIENCY!

The Temprite "Oilrite" automatic oil separator retains the compressor oil in the crankcase, permits the refrigerant to work at its true boiling point, increases heat transfer of the evaporator and prevents scored parts and burned bearings. Sizes from $\frac{1}{6}$ H. P. to 60 tons.

The Temprite accumulator interchanger traps and evaporates any liquid refrigerant that may spill over from the evaporator. A liquid line, suction line heat exchanger which increases system capacity and prevents damage to the compressor.

Temprite equalizer tanks eliminate short cycling of the condensing unit by storing refrigerant gas on the suction side of the system. Reduces wear on motors, belts and controls and also reduces power consumption.

Temprite two temperature valves assure *accurate* control of evaporator temperatures. Extremely rugged and extra sensitive, these valves have large capacity and a wide range of adjustments.



TEMPRITE PRODUCTS CORP.

Originators of Instantaneous Liquid Cooling Devices

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Alabama State Holds Annual Meeting

THE state meeting of the Alabama State Association was held in the Hotel Admiral Semmes, October 17-18. The meeting was called to order by W. L. Anderson, President of the Azalea City Chapter, and the invocation was given by Rev. Father Byrnes. City Commissioner E. M. Megginson welcomed the convention members to the city of Mobile. J. M. Manley, State President, gave the response to the welcome address, expressing the thanks of the convention members to Rev. Father Byrnes and Commissioner Megginson for their part on the program. He also expressed his belief that the organization would grow rapidly within the next six months.

The educational program opened with a talk by L. W. Larsen of Tecumseh Products Co., Tecumseh, Mich. His subject was "Installation and Service of Hermetic Units." He highlighted in his talk the problems of the serviceman in the field when repairing hermetic units. He answered many questions from the floor relating to the subject.

Next on the program was a motion picture made by the Revere Copper & Brass Company, showing the manufacture of various forms of copper and brass products. The movie, in color, was most entertaining and educational.

The last talk of the day, given by Franklin Y. Carter, Chief Sales Engineer, Detroit Lubricator Company, was on the subject "Design and Application of Thermostatic Valves." Projected slides illustrated the operation of each valve.

At 7:00 p.m., members and visitors of the convention sat down to a dinner at which the manufacturers' agents acted as hosts. E. V. Dunbar was the Toastmaster, and Dr. Walter O. Walker the speaker of the evening. Dr. Walker reviewed a meeting held in Chicago a short time ago.

Saturday Morning

Continuing with the educational program Saturday morning, W. J. Donovan, Heat-X-Changer Co., Brewster, N. Y., gave a carbonator and soda fountain demonstration. He demonstrated a new type soda dispenser set up and displayed in the meeting. Mr. Donovan also compared the old and new type water coolers, illustrating with diagrams on the blackboard.

Next on the morning's program was L. C. Warren, President of the Atlanta Chapter, who discussed Larkin coils. He illustrated his various points with diagrams drawn on the blackboard.

An educational color movie entitled "Orr-bilt Method of Refrigeration Reconditioning" was next on the program. This movie, which took the audience on a tour of the Orr Company's shop in Atlanta, Ga., showed a step by step process of reconditioning units from the time of arrival until the repaired unit was ready for shipment back to the customer. B. H. Dillard was the narrator.

Al Barrere of Russell Electric Co., Mobile, Ala., talked on the subject of "Electric Motors," stressing the importance of this segment of the refrigerating system and the part they had played in the general growth of our industrial world. He then discussed the six types of electric motors used in refrigeration work and the factors contributing to motor failure.

The meeting adjourned for luncheon at which the jobbers were the hosts with Joe Parker acting as toastmaster.

Saturday Afternoon

When the meeting reconvened in the afternoon, Herman Goldberg, representing the Standard Refrigeration Co., Chicago, Ill., demonstrated stainless steel evaporators, pointing out improvements in construction, using pictures and diagrams to illustrate. Mr. Goldberg gave, in addition, a discussion on counter-flow condensers. A Standard

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Superior *Life-Time* DIAPHRAGM PACKLESS VALVES

OUTSTANDING FEATURES

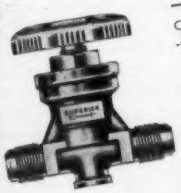
1. Husky one-piece lower stem.
2. Controlled stem travel ensures "Life-Time" diaphragm performance.
3. Scientific lubrication, large bearing surfaces and polished stem heads eliminate wear and ensure smooth, easy operation.
4. Large drillings give full flow
5. Operates under normal pressure with flow in opposite direction.
6. Smooth pleasing appearance — symmetrical design.
7. Individual wrench pads for tightening flare connections.
8. Unique sweat connections permit soft or silver soldering without removing internal assembly.
9. High quality, long wearing, seating insert.
10. No special tools required for servicing.

Superior ANGLE VALVES

CATALOG NUMBER	CONNECTIONS SIDE	CONNECTIONS BOTTOM	LIST PRICE EACH	NET WT EACH LBS	CODE WORD
	SAE Flare	Male Pipe			
104-4B	¼"	¼"	$5.00	.75	Lefom
104-4C	¼"	⅜"	5.00	.75	Lefro
104-6B	⅜"	¼"	5.00	.75	Lefus
104-6C	⅜"	⅜"	5.00	1.00	Legaz
105-8B	½"	¼"	5.00	1.00	Legon
105-8C	½"	⅜"	5.00	1.00	Legac
106-10D	⅝"	½"	6.00	1.25	Lekad

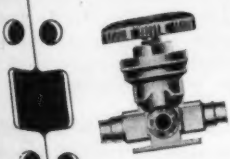
Superior LINE SHUT-OFF VALVES*

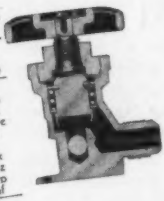
CATALOG NUMBER	CONNECTIONS	LIST PRICE EACH	NET WT EACH LBS.	CODE WORD
	SAE Flare	$5.30	.9	Lelm
204-4	¼"	5.30	.9	Lelot
204-6	⅜"	5.30	1.25	Lemaf
205-8	½"	6.60	1.5	Lemjo
206-10	⅝"			
	O.D. Sweat	5.30	.9	Lemuz
204-4S	¼"	5.30	.9	Lenag
204-6S	⅜"	5.30	1.25	Lenek
205-8S	½"	6.60	1.5	Lenov
206-10S	⅝"			



Superior BRANCH SHUT-OFF VALVES*

CATALOG NUMBER	CONNECTIONS	LIST PRICE EACH	NET WT. EACH LBS	CODE WORD
	SAE Flare	$6.25	1.00	Lepem
304-4	¼"	6.25	1.00	Lepuc
304-6	⅜"	6.25	1.50	Lepwe
305-8	½"	7.50	1.75	Leraj
306-10	⅝"			
	O.D. Sweat	6.25	1.00	Lesak
304-4S	¼"	6.25	1.00	Lesoz
304-6S	⅜"	6.25	1.50	Letep
305-8S	½"	7.50	1.75	Letuf
306-10S	⅝"			





Page

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evaporator was contributed to the meeting as an attendance prize to be drawn for after the meeting.

Gene Price of Penn Electric Switch Co. was next on the program, demonstrating control functions. The four basic types of controls were covered and Mr. Price used colored slides to illustrate.

Dr. Walter O. Walker, Director of Research, Ansul Chemical Company, Marinette, Wis., gave a highly educational talk on "Solids in Refrigeration Systems." He stressed the importance of keeping moisture out of systems; gave a detailed discussion on wax formation and how to determine if wax is present. He then showed pictures of recent experiments made in his laboratory on the effects of methyl on aluminum.

The final talk of the day was given by Bert Kaple of Copeland Refrigeration Corp., discussing "The Serviceman's Future." He also discussed the construction of Copeland units, using the blackboard to illustrate how easily repaired these units are in the field.

Between the hours of 6:30 and 7:45 p.m. the convention members were entertained at a cocktail hour, and the final feature of the meeting was the annual banquet and dance at which the Alabama State Association was the host and John M. Manley the toastmaster.

* * *

DIRECTORS OF RSES MEET TO PLAN EXPANDED PROGRAM

MEETING in Chicago, October 2, 3, 4 and 5, the officers and board of directors of the International Refrigeration Service Engineers Society spent three full days discussing ways and means of expanding the Society's services to its members and laying plans for its future activities.

Representatives at the meeting were the following: W. W. Allison, President, Los Angeles, Calif.; W. Marshall, First Vice-President, Toronto, Ont.; Chas. C. E. Harris, Second Vice-President, Cambridge, Mass.; C. J. Doyle, Treasurer, Omaha, Neb.; H. T. McDermott, Secretary, Chicago, Ill.; J. L. Driskell, Sergeant-at-Arms, Burley, Idaho.

Directors W. E. Booth, Richmond, Va.; C. S. Tucker, Birmingham, Ala.; A. L. Robertson, Madison, Wisc.; O. C. Yates, Seattle, Wash.; Earl Yockey, Columbus, Ohio; Napoleon Brossoit, Verdun, Queb.

Board of Advisors: J. M. Manley, Alabama; A. J. Pike, Interprovincial Association; J. Sackey, Illinois; G. Schuld, Buckeye State; W. M. Tierney, New England States; W. Bullis, Wisconsin.

Past Presidents W. H. Moss, Memphis, Tenn. and C. Buschkopf, Beaver Dam, Wisc.; and Paul B. Reed, Chairman of the Educational and Examining Board.

Among major considerations discussed were plans for an expanded educational program pointed to chapters and individual members. Much of the educational program will revolve around the compilation of the All-Makes Perpetual Service Manual, providing members with volumes of pertinent information on products, servicing and installation data, application and engineering information. The compilation of this manual will represent years of activity, but when completed will represent a valuable contribution to the literature on refrigeration. The manual will be set up so that information as issued can be conveniently substituted for outdated material.

One session of the directors' meeting was devoted to a joint discussion with a committee of the Refrigeration Equipment Manufacturers Association, consisting of Messrs. H. Spoehrer, K. B. Thorndike and J. A. Strachan, to consider the advisability of conducting jointly educational conferences in off years in which the All-Industry Air Conditioning and Refrigeration Exposition is held. These conferences would bring to different sections of the country an educational exhibit manned by service and engineering personnel. Committees of both associations, following these preliminary discussions, are to meet again to explore its further possibilities.

Revisions to the constitution and by-laws were discussed by the directors to provide additional revenue for the educational program and increased representation on the board because of the expansion of the Society.

It was disclosed in a report on membership that at the close of the fiscal year ending June 30, 1947, the total membership of the Society was 10,610 as compared with a membership report of 6,468 at the last annual convention.

Plans were discussed for the forthcoming 10th Annual Convention of the Society in Cleveland, January 21-24, at which the Buckeye State Association will act as hosts to the meeting.

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BUCKEYE ASSOCIATION BUSY ON CONVENTION PLANS

DIRECTORS representing nine of the eleven Buckeye (Ohio) State chapters met October 18 and 19 in Dayton to formulate plans as hosts to the 10th Annual RSES Convention in Cleveland, January 21-24.

The Ohio group, especially Cleveland Chapter, has had recent experience in convention planning, having handled the many details of the successful 9th Convention held in that city October, 1946. The plans for making the 10th Convention the largest the Society has ever held will follow closely the same pattern as last year.

Oren Nichols, Jr., president of the Buckeye Association, discussed fully the various committee functions and appointed the chairman to head each committee. The chairman will in turn select additional members from various Ohio chapters to serve on their respective committees.

Chairman of the committees are:

General Convention Committee: R. D. Hollingsworth, Cleveland Chapter.

Entertainment Committee: Rod O'Flaherty, Cleveland Chapter.

Publicity Committee: Paul Spring, Cleveland Chapter.

Housing Committee: Emil Flanik, Cleveland Chapter.

Reception Committee: Elmer Weidwald, Cleveland Chapter.

Sergeant-at-Arms — Forrest D. Poole, Southern Ohio Chapter.

The educational program will be arranged by the International Educational and Examining Board of which A. M. Fenwick, Cleveland Chapter, is a member and who will act as liaison member between the International Educational Committee and local committees.

* * *

MIDLAND EMPIRE, NORTH MONTANA CHAPTERS MEET

THE Midland Empire and North Montana Chapters held joint meetings recently in Key City, Mont. The address of welcome was given the meeting by George R. Marsh, president of the Lewistown Rotary Club. O. C. Yates, Seattle, member of the International Board of Directors, presented an illustrated lecture on reverse cycle refrigeration. James Reynolds of Butte, Mont., representing Minneapolis-Honeywell Regulator Co., demonstrated the application of refrigeration controls. It was decided that future joint meetings would be held at Lewistown due to its convenient location in the Treasure State.

Norman Sulnes, Billings, Mont., is Presi-

John S. Mackinlay (center) and Jack Clarke (operating controls), Jack & Heintz Precision Industries Service Engineers, answer questions about glass evaporators during R.S.E.S. meeting on October 14th at the Allerton Hotel, Cleveland, first of a series of educational entertainment programs presented in eight meetings throughout the Midwestern and Southern states.

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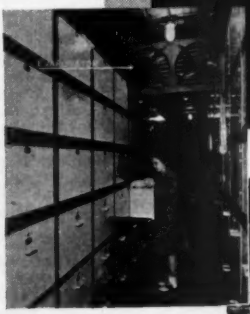

• **Write for Bulletin 16**

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dent of the state organization and S. C. Wacker, Great Falls, is State Secretary. Mr. and Mrs. Robert D. Young of Lewistown were in charge of the arrangements for the convention. Next meeting of the state organization is planned for April or May of 1948.

CHICAGO CHAPTER HOLDS TOWN HALL MEETING

THE regular October meeting of Greater Chicago Chapter was well attended to hear the Town Hall discussions under the guidance of Herman Goldberg, of The Herman Goldberg Company, as Moderator. Mr. Goldberg opened the Town Hall session by introducing the speakers who were: Dr. Walter O. Walker, Director of Research for Ansul Chemical Company; Walter Hobbs, Director of Research Laboratory of Ranco, Inc.; John Ammel, Mgr. Commercial Department, Products Div. of Nash-Kelvinator Corporation.

Dr. Walker discussed the foreign substances that occur or are introduced into the refrigeration systems which cause operational troubles. He outlined the laboratory test procedure used in determining wax separation in oils and illustrated his talk with slides.

Walter Hobbs followed as the next speaker and discussed the various types of thermostat bulbs. He continued by pointing out the importance of proper bulb location for contact, immersion, and air control type thermostats. Special dual power element controls were described and demonstrated.

The third speaker was John Ammel who discussed the manufacturer-service engineer relationship. Mr. Ammel went into considerable detail in his talk to impress the members and guests present that the refrigeration service industry is a fertile field. He continued by pointing out the importance of keeping up with modern improvements and changes in equipment, and stressed the advisability of all service engineers improving their tool kits by obtaining the modern tools and test equipment.

After Mr. Ammel had completed his talk, Mr. Goldberg invited all present to ask questions on any of the topics covered. All three speakers were asked to elaborate on parts of their talks which proved to be very enlightening. This is the third successive year that Chicago Chapter has followed the Town Hall meeting plan and it is becoming a meeting that all look forward to attending.

Chapter Notes

• ARROWHEAD CHAPTER, *Riverside, Calif., Sept. 8*—Louis Long of the Wagner Motor Company was the speaker of the evening on the subject of motors and particularly on those motors employed in refrigeration. He discussed the different kinds and types, and the question of why some motors of the same rated horsepower are not suitable for different kinds of work. A ¾ hp. motor was presented to the chapter by Wagner as a drawing prize and Carlton Ricker was the winner. Drawing for the motor increased the chapter treasury by $46.50.

The above photo taken at the October 13th meeting of the Arrowhead Chapter, shows retiring President Ray Zimmer (right) presenting a plastic arrowhead gavel to President-elect Herbert Kaeding (left).

At the October 13th meeting held in the American Legion hall, a discussion and demonstration on the use of Sil-Fos and Easy-Flo silver solder was held. Plans for the first anniversary party to be held next January were discussed and Carlton Ricker introduced the speakers of the evening, Mr. Carse of Linde Air Products Co., and Mr. Ross of Handy Harmon Co. Forty nine members and guests were present at this meeting.

o ATLANTA CHAPTER, *Atlanta, Ga., Sept. 25*—The annual election of officers held on this date resulted in the following: Clyde H. Bishop, *President;* M. B. Orr, *1st Vice-President;* Norwood C. Carter, *2nd Vice-President;* Henry W. Gullatt, *Secretary-Treasurer;* Ralph M. Berry, *Sergeant-at-Arms.* Directors—Charles S. Biggers, L. C. Warren, Jr., Ivan J. Boyce, and J. B. Mathis. On the educational program, R. L. Brooks, Merchandise Division, Georgia Power Co., gave a most interesting talk on the beginning of refrigeration in the United States. He traced the original patent to the first commercial ice machine built for resale which, to the surprise of the chapter, turned out to be one made by the Columbus Iron Works, Columbus, Ga., sometime around 1885.

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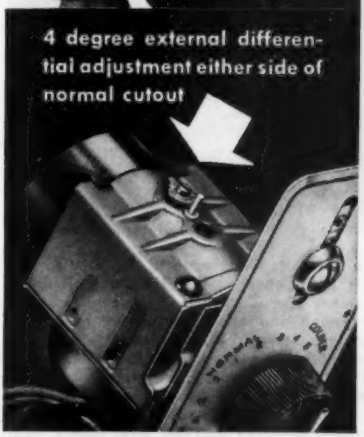

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• BORDER CITIES CHAPTER, *Ontario, Can., Sept. 26*—With 40 members present, the chapter met in the sales room of Purity Dairies, Ltd. Earl Jennings of the Temprite Corporation was the speaker of the evening, introduced by Wilf Maybee. He gave an interesting talk on Temprite equipment which proved of extreme value to his entire audience. This was followed by the motion picture "Fundamentals of Refrigeration."

The Calgary Chapter held its 5th Annual Dinner and Dance at the Bowness Golf Club, September 25. Cocktails were served to start the evening and approximately an hour later dinner was served. Dinner speakers were dispensed with this year, and H. R. Dickieson had little to do but thank those present for their attendance. The President of the chapter, however, told an anecdote with the moral of cooperation. Dancing followed after dinner, continuing until 1:00 a.m.

• CANTON REGIONAL CHAPTER, *Canton, Ohio, October*—The speaker was D. H. Bodine of Copeland Corp., who discussed the Copelmetic unit, showing its construction and operation. A unit was used for demonstration purposes with Mr. Bodine dismantling and reassembling the unit. Future educational programs reported by the chapter will include representatives from Temprite, Mueller Brass, Remco, Cutler Hammer and Rotary Seal Companies.

• CENTRAL ARIZONA CHAPTER, *Phoenix, Ariz., Aug. 16*—Chuck Chidester of Pacific Scientific Company gave an enlightening talk and demonstration on Alco Valves, using both a glass evaporator and slides to illustrate.

At the September 9th meeting, President Tally introduced Messrs. Sears and Doepel of the Lynch Manufacturing Co. Mr. Sears then proceeded to present a demonstration and talk on Par condensing units and other lines manufactured by the Lynch Company.

• CENTRAL NEW YORK CHAPTER, *Syracuse, N. Y., Oct. 14*—The meeting was held at Gould-Farmer Company, General Electric distributor, with a very large attendance. Business was dispensed with so that Messrs. Ames and Hubbard of the company could have as much time as possible to show two reels of film in color, to those present. Refreshments were served to the members after which they spent some time in the inspection of equipment. Of the many appliances on display, milk coolers and farm and home freezers seemed to hold the most interest.

• CENTRAL PENNSYLVANIA CHAPTER, *Harrisburg, Pa., Oct. 16*—The annual election of officers was held by the chapter with the following results: A. E. LeFevre, *President;* H. R. Kelly, *1st Vice-President;* W. N. Haas, *2nd Vice President;* J. L. Butler, *Secretary;* A. D. Wynn, *Treasurer;* and R. J. Sage, *Sergeant-at-Arms.*

• CHARLESTON CHAPTER, *Charleston, W. Va., Sept. 9*—Guests for the evening, introduced by Mr. Frame, were R. J. Griffith and Jess W. Rowe. Speaker of the evening was Oliver J. Kesti, Lehigh Manufacturing Co. Mr. Kesti spoke on the subject of Lehigh "Blu-Cold" condensing units. A cutaway Blu-Cold compressor and seal assembly were exhibited and Mr. Kesti conducted a round table discussion on the units, with members participating.

At the October 14th meeting, E. R. Dunlop and Robert Raney of Ranco, Inc., led an interesting discussion on controls. Among other things they explained the advantages of the use of different gases in the power elements and explained the operation of the toggle mechanism and other parts of the controls.

• COLONELS CHAPTER, *Louisville, Ky., Sept. 18*—The meeting was devoted primarily to business with a portion of the evening devoted to general service and business discussions. The October 2nd meeting included much the same program.

• COLUMBUS CHAPTER, *Columbus, Ohio, Oct. 15*—Some 85 members turned out for this meeting. George J. Schuld, Sr., Chairman of the National Safety Committee, gave a very interesting address to the members on safety. In opening, Mr. Schuld first stressed the importance of an organization of this type in order to be in a better position to solve the many problems that face the membership. Mr. Schuld then cited several examples of how larger groups had accomplished things that one person or a very small group could not expect to ever accomplish. Then swinging into the safety phase of his address he gave a list of 51 items the service engineer should not do, and closed by citing how several service engineers had lost their lives as well as taking the lives of others by failing to exercise care in their work.

Two International Directors, O. C. Yates of

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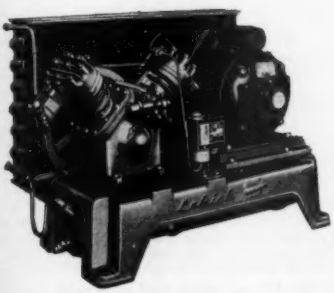

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Members, their families and friends who attended the third annual picnic of the Furniture City chapter held August 6, at Long Lake Park near Grand Rapids, Mich. Prizes were awarded for the games and sports events. Liquid refreshments were provided and everyone brought their own basket lunch.

Seattle, Wash., and Earl Yockey of Columbus, Ohio, were in attendance along with two National Committeemen, Mr. Schuld, the speaker, and A. E. Graff of Ranco, Inc., who is Chairman of the National Educational Fund Committee. Al Yoe of the Luthie and Welch Co., was appointed to serve the chapter as secretary, finishing the unexpired term of Charlie Belt. Refreshments were served following the meeting.

• DAYTON CHAPTER, *Dayton, Ohio, Oct. 10*—Richard A. Gregg and Ervin J. Hastings were welcomed as new members of the chapter. On the educational program, Mr. Bradshaw of Associated Plastic Company, displayed an Esko Tray, which is a plastic ice tray, to a very interested audience. Then B. A. Hackman of the Cutler Hammer Company, showed a motion picture on safety switches. The meeting then turned to a discussion of a service problem brought up by Mr. Denny.

• DIRIGO CHAPTER, *Auburn, Maine, Oct. 14*—Ray Graham, agent for the Kramer Trenton Co. in New Jersey, was the speaker of the evening. Using a ½ hp. unit equipped with a miniature Thermobank, Mr. Graham gave a fine demonstration of its operation. He went further into the details of principles of operation through the use of projected slides. There were many questions asked Mr. Graham after the presentation and the entire program proved to be very enjoyable.

• FOX RIVER VALLEY CHAPTER, *Manchester, Wis., Oct. 1*—During the course of the regular business meeting it was agreed by the members present to inaugurate an attendance prize to all future meetings for the purpose of encouraging a better attendance of the chapter members. Only chapter members present at future meetings will be eligible for the prize. John W. Hall, representing the Automatic Products Co. of Milwaukee, gave a very interesting and descriptive talk on A-P expansion valves, suction pressure regulating valves and water valves, after which refreshments and lunch were served.

• FURNITURE CITY CHAPTER, *Grand Rapids, Mich., Aug. 6*—The third annual picnic was held at Long Lake Park for members, their families and friends. The picnic committee arranged a program of games and prizes for all ages and everyone had a fine time. Lloyd West and Ken Henry were crowned horseshoe kings after dethroning the former champions, Joe Schroeder and Ralph Bovee, the pride of Route 2, Sparta. Ice cream, coffee, pop and beer were provided and everyone brought a basket dinner. A sound truck was furnished by Mr. Buckley which provided music during the dinner and assisted in calling the group together for running off the games and contests.

At the September 9th meeting, 54 members and 11 visitors enjoyed the dinner and the showing of the glass evaporator by John Schenk of the Alco Valve Co., assisted by Roy McCrady. Among the visitors were Professor "Mike" McCue and John Hendrickse of Ferris Institute, Big Rapids, and a group from the Bastian-Blessing Co. of Grand Haven.

On October 7th the regular monthly dinner

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meeting was held at the Oakwood Cafe in the Banquet Rooms. The speaker of the evening was Harold Stamps of the Henry Valve Co., who presented slides and gave a brief talk on valves and driers. Also present and called upon for answers and discussion were Carl Picker of Mills Industries, and Floyd Duvall of Ansul Chemical Co.

• GRANITE STATE CHAPTER, *Manchester, N. H., Sept. 16*—The meeting was preceded by a roast beef dinner with 48 members present. The business session was devoted largely to plans for the coming season's activities, with the educational program being outlined and specific subjects assigned for each meeting. In the lineup will be one social meeting to be known as Ladies Night. On the educational program for the evening, Fred Binns of Virginia Smelting Company gave an interesting talk on refrigerants, which was followed by a Question and Answer period. It was decided that all future meetings would be held on the second Tuesday of each month.

• GREENVILLE CHAPTER, *Greenville, S. C., Sept. 10*—The entire meeting was devoted to business. Two new members were accepted to membership—McIver C. Yates as an active member, and William Ansel Smith as a junior member. The October 8th meeting was also devoted to business.

• HEAD OF THE LAKES CHAPTER, *Duluth, Minn., Oct. 6*—The entire meeting was devoted to business, during the course of which the office of Secretary and Treasurer was combined and the new office of Recording Secretary created.

• INDIANAPOLIS CHAPTER, *Indianapolis, Ind., Sept. 9*—During the course of this meeting, J. Patterson and H. Spall were welcomed as new members of the chapter. In addition the application of J. Elliott was read.

On September 23rd a special meeting was held to hear a representative of the American Injector Company present a talk on high side floats and oil separators. The talk proved very educational and many of the members learned for the first time what goes on inside an oil separator while it is doing its job. Refreshments were served after the meeting.

• JOPLIN CHAPTER, *Joplin, Mo., Oct. 8*—Announcement was made at this meeting of the forthcoming soldering demonstration to be held November 17th by the Mueller Brass Co. A round table discussion on service troubles occupied some time and two films from the National Society series were shown.

• KANKAKEE VALLEY CHAPTER, *Kankakee, Ill., Oct. 7*—This was a dinner meeting with the dinner being served at 7 p.m. at Sully's Dining Room. The meeting started immediately after, with Ben Hursh presiding. Guests at the meeting were Jack Glass of Chase Refrigeration Supply Co., Bill Cramer, Service Engineer, Minneapolis-Honeywell Regulator Co., and Ed Riccio, president of the Chicago chapter. Jack Glass brought with him a glass evaporator which he demonstrated before the group. Bill Cramer presented a motion picture on electricity and provided the audience with literature on his company's products. Future meetings will be held the first Tuesday of each month.

• KEY CITY CHAPTER, *Dubuque, Iowa, Oct. 8*—The guest speaker of the evening was Felix Wierman, representing The Herman Goldberg Co. The talk was mainly on Chicago valve plates, Ansul gas, Ranco controls, Standard products, and DFN dehydrators. Visitors were: Jerry Frizzell of the White Refrigeration Supply, and "Woody" Larson of the Thermal Co. Inc.

Members of the Kankakee Valley Chapter attending meeting of October 7 are: Back row, standing left to right: Ben Hursh, President; William Ward, Vice President; James O'Connor, Secretary-Treasurer; William Stearns, Chairman of the Educational Committee; Franklin Dupuis, Sergeant-at-Arms; Arshall Marcotte. Middle row: Clifford Moody, Albert Milligan, Donald C. Smith, Wayne Purvis E. J. Tatro, Robert Petty. Front row, John Mucha, Warren Surber, William Wood. Other members not present at the meeting when the picture was taken are: William Brosseau, Frank Larson, E. Trumble, Ben Hess, Fred Rattunde, and James Stupka.

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THE REFRIGERATION REFERENCE MANUAL NO. 3

3.00

Kern County Chapter members, their families and friends enjoyed a get together dinner dance recently, the first social event of the Fall and Winter season.

● LA CROSSE CHAPTER, *La Crosse, Wis., Sept. 8*—The meeting opened with a dinner served at 7:30 p.m. including chicken and ham served family style. At the conclusion of the meal, President Sargent, acting as toastmaster, requested that each couple present get up and introduce themselves. He then called on Elmer Peterson and his guests, Raymond and Vincent Sweeney, and Fred Bethan for short talks. The chapter officers for the year 1947-48 were introduced. Door prizes and prizes for the ladies were drawn and distributed. The Leo Schmitz Trio furnished music for dancing. At 11:30 drawings for door prizes were again held, the winners being obliged to perform for their prizes. Dancing continued with Circle Two-Steps being called by Vincent Sweeney. The party concluded at 1:00. According to comments heard from those in attendance, an enjoyable evening was had by all.

Those contributing prizes for the evening were La Crosse District, Sargent Refrigeration Co., Automatic Temperature Supply, Refrigeration & Industrial Supply (St. Paul Branch), and W. A. Roosevelt Co. Those who attended included Mr. & Mrs. James M. Brandon, Arcadia; Arvid Deters, Caledonia; Fred H. Rust, Houston; R. E. Schendel, Cashton; Frank A. Wehrer, Sparta; C. W. Erlandson, Tomah; D. F. Gallagher, Sparta; Vincent Sweeney and Raymond Sweeney, Madison; Elmer Peterson & party, St. Paul; Harry Albers, West Salem. Those from La Crosse were James Volden, Mr. & Mrs. George Brenstein, Charles Fiedler and family, Emmet Flick, Louis J. Gaister, Harold H. Johnson, F. A. Reiman, J. W. Brindley, A. W. Roellig, Ernest Yanke, H. S. Sargent, W. W. Schomburg, Melvin M. Talle, and Alfred Peterson.

The October meeting was devoted mainly to business. However, an informal discussion on equipment franchises, hourly wage rates, and cooperative purchasing followed.

● LIMA CHAPTER, *Lima, Ohio, Oct. 16*—The meeting, attended by 13 members, was held at headquarters of the Allied Supply Co. A short business session was held, then the meeting opened to a general discussion which covered a long range of service problems.

● LONG BEACH CHAPTER, *Long Beach, Calif., Oct. 8*—Thomas F. Carter, a consulting engineer of Los Angeles, showed and commented on a technicolor motion picture portraying the vast frozen food industry. The meeting was preceded by a "chuck wagon" stew dinner, arranged for by Lyle Evans and his Eats Committee. Airplane ride tickets, donated by Jack Smith, were raffled off and the winners were Arnold Schimmeyer and Wayne Bartlett. Other prizes offered were won by Paul Travers, Roy Sexton, Jim Carnahan and Pat Riley.

● LOS ANGELES CHAPTER, *Los Angeles, Calif., Sept. 24*—With 52 members and guests present at the meeting, three representatives of hermetic unit manufacturers presented a very interesting program on the subject of "Servicing Hermetically Sealed Units in the Field." The speakers were Al Wills of Frigidaire, Carl Olin of Servel, and Elwood French representing Crosley. Although it had been planned originally to allow 15 to 20 minutes for each speaker, the interest of the group was so great and the questions asked so many that each speaker required 40 minutes to present his story. It was an intensely interesting evening for everyone.

● MADISON CHAPTER, *Madison, Wis., Oct. 9*—The meeting was held at the Park Hotel in Madison and the educational program included a discussion on hot gas defrosting. Many points of interest and many helpful suggestions were provided.

● METROPOLITAN NEW YORK CHAPTER, *New York, N. Y., Sept. 26*—Seventy-two members and twenty-nine guests were present, making a total of one hundred and one at the meeting. Doc Abbott and his associates of the Detroit Lubricator Co., gave an illustrated lecture on the use of their expansion valves. A test setup for inspecting and reconditioning valves was also demonstrated in connection with an explanation that a large percentage of valves are returned to the factory for repair and found to have nothing wrong with them. Also that a larger percentage had nothing more than an incorrect superheat adjustment. Two door prizes offered during the evening were won by guests.

● MIAMI CHAPTER, *Miami, Fla., Sept. 10*—This meeting was devoted almost entirely to

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business, but one of the highlights of the evening was the serving of a richly baked ham, pickles, mustard, bread, beer and Coca Cola while the raffle of a Wiggins voltage tester was in progress.

At the September 24th meeting the Educational Chairman gave a short lecture on driving safely, then conducted a true and false quiz contest. Members submitted refrigeration questions which were thoroughly discussed and, as far as possible, answered.

• MONUMENTAL CHAPTER, *Baltimore, Md., Oct. 14*—Jerry Scherr and Jack Ottenheimer were appointed as a committee of the chapter to meet with the electrical contractors and prepare a refrigeration and electrical code. George Roche, Chairman of the Educational Committee, introduced Charles Boylan, sales engineer of the Weatherhead Co., who talked on "Moisture in Refrigeration Systems." A lengthy and interesting discussion followed.

• NIAGARA FRONTIER CHAPTER, *Buffalo, N.Y.*—A corn roast at the home of Mr. and Mrs. Walter Bobzien at Newfane, N. Y. was held recently. The weather was mild and about 28 were present from Buffalo, Lockport and Medina. Mrs. Bobzien was ill and confined to her bed but even this failed to put a damper on the party. Besides eating all the hot dogs and corn on the cob one could hold, and washing it down with beer, Mr. McCormick and Mr. Bush told a number of appropriate stories with some effects and gestures.

• ONTARIO MAPLE LEAF CHAPTER, *Toronto, Ont., Sept. 19*—The speaker of the evening, John Mahaits of Liquid Carbonic Corp., talked on "Servicing Various Soda Fountain Hook-ups." His talk was followed by the usual question and answer period which became quite lively. J. W. McKee, past President, thanked Mr. Mahaits for his talk and Mr. Wardell for his efforts in obtaining the talk. Mr. Henderson reported that while on his recent trip for Wagner-Sangamo Electric to Western Canada, he visited both the Calgary and Winnipeg Chapters. These chapters send greeting to the Ontario Maple Leaf Chapter.

• PENINSULA CHAPTER, *Newport News, Va., Sept. 25*—W. E. Booth, International Director, and Ralph Lampie of Richmond Chapter, were visitors of the evening. Mr. Booth conducted a discussion on organizational proceedings of a new chapter. Educational Director, Eugene Zepkin, asked the members to make suggestions on types of educational programs they wanted, and after some discussion the consensus of opinion turned to such subjects as air conditioning in surgery, and the basic principles of refrigeration as a refresher course, to be followed by the wiring of all types of controls. President George Blount asked for the nomination and election of a Board of Directors which resulted in A. Long, L. E. Causey and Raymond Fisch being elected.

• READING CHAPTER, *Reading, Pa., Sept. 23*—Educational Director Oscar Larson introduced Mr. Williams, President of the Airserco Mfg. Co., Inc., of Pittsburgh, Pa., who gave a very interesting talk and demonstration on modern testing equipment related to the refrigeration industry. The demonstration included the thermostatic valve analyzer which detects defects without removing the thermostat from the refrigerator cabinet; the new Unit Starter and Analyzer which starts up defective compressor units without tearing apart the motor assemblies; the new portable electric Evacuator which permits the service engineer to evacuate hermetic units, change oil in compressors, and performs numerous other service short-cuts.

• SACRAMENTO VALLEY CHAPTER, *Sacramento, Calif., Oct. 2*—The greater part of the evening was devoted to business, then George Frazer gave a talk on electrical phase and the use of the oscilloscope.

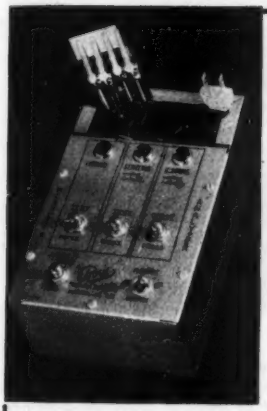
• ST. LOUIS CHAPTER, *St. Louis, Mo., Sept. 24*—J. C. Battles and Ed. Kellie, both of the American Injector Company, presented a discussion on the effects of oil circulating with refrigerant in a system. The talk by Mr. Kellie was illustrated with charts and a blackboard which brought out the fact that an oil separator is a necessity. Following his talk Mr. Kellie answered many questions from the floor and Mr. Battles distributed literature. Winners of attendance prizes were Charles Barmeier, George Kadar and Leonard Vollman. Refreshments served after the meeting were provided by American Injector Company.

• SAN DIEGO CHAPTER, *San Diego, Calif., Sept. 19*—Bill Krack of Penn Electric Switch Co., gave an interesting lecture and demonstration through the use of slides and Penn Switch products. It was reported during the meeting that Frank Cleaver, member of the chapter, is out of the hospital after an illness lasting about six months.

• SEATTLE CHAPTER, *Seattle, Wash., Sept. 2*—O. C. Yates took charge of the educational program of the evening in the absence of Educational Director M. Smith. Mr. Yates spoke on the subject of Temprite carbonators, their function and uses.

The September 26th meeting was an open meeting held especially for the purpose of introducing R.S.E.S. to men from the outlying districts of Seattle, several of whom were considering the formation of a chapter in their territory. William Allison, International President, was present for the occasion and O. C. Yates, Chapter Historian and member of the International Board of Directors, talked on the benefits of membership in the Society. Mr. Allison spoke at some length on the organization, its growth and potentialities, and then told of plans for the forthcoming California State Convention. Several new members were initiated by Mr. Allison, then the meeting wound up with refreshments being served.

• SPRINGFIELD CHAPTER, *Springfield, Ill., Oct. 5*—The first annual picnic since the close of the war was held at Douglas Park, Springfield, Ill. Thirty-eight were in attendance with all the fried chicken, trimmings and homemade cakes the group could consume. Activities included bingo for the ladies, with a drawing for an electric clock provided by



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U. S. Electric Co., horseshoe pitching for the men and a big poker game. Refreshments included soft drinks furnished by the chapter, coffee and cream by Dick Potter, ice cream provided by Meadow Gold Ice Cream Co. The committees were well pleased with the turnout and grateful for gifts from various companies.

• TOLEDO CHAPTER, *Toledo, Ohio, Oct. 8*—President Foster called the meeting to order with 22 members present. Announcement of the forthcoming Christmas party was made, and on the educational program questions were read on domestic and commercial refrigeration and members took them up for discussion.

• TWIN CITIES CHAPTER, *Minneapolis, Minn., Oct. 7*—The greater part of the meeting was devoted to business discussions, among them ways and means of improving educational programs and increasing membership activity. It was felt that in order to obtain good speakers, money should be taken out of the treasury, if necessary, to pay these speakers. The educational program of the evening included the film entitled "Servicing and Adjusting an Automatic Expansion Valve."

• WESTERN MASSACHUSETTS CHAPTER, *Springfield, Mass., Oct. 14*—J. H. Spence, Hussmann Refrigeration, Inc., gave an interesting talk on servicing open top self-service display cases. The balance of the meeting was devoted to business.

Imperial Brass Company sponsored a tube-bending contest recently for the Virginia Chapter. Mr. Wilson of Imperial Brass acted as one of the judges, awarding the prizes. After the contest an entertainment was held and refreshments served to the 52 members present.

In the picture, top left, are shown the prize winners of the contest. They are, left to right: H. M. Rosemond, Hopewell, Va., 1st prize; H. G. Hoffs, Richmond, Va., 2nd prize; and Alvo Hauk, Richmond, Va., 3rd prize. Officers of the chapter are shown top right, standing—left to right are: Argie Elliott, Secretary; Ralph W. Lampie, Corresponding Secretary. Seated, left to right: W. Booth, Director; Paul B. Bruffey, President; Alvo Hauck, Vice President; and Eugene Martin, Treasurer. In the picture, bottom left, Mr. Wilson of Imperial Brass Co. presents H. M. Rosemond of Hopewell, Va. 1st prize, as a winner of the tube-bending contest. Second prize awarded to H. G. Hoffs, Richmond, Va.

• WINNIPEG CHAPTER, *Winnipeg, Can., Sept. 19*—Future educational programs announced during the meeting will include monthly movies, two of which were shown during this meeting. Interesting points about the film were discussed, then the Educational Chairman gave an informative talk on the care and use of tools. President Jim Gibson told the chapter that an early acceptance of the refrigeration servicemen into the licensed trade groups of the province was expected, but that much work had yet to be done.

• WOLVERINE CHAPTER, *Lansing, Mich., Oct. 13*—During the business session, arrangements were made to contact delinquent members in an effort to get them back in good standing. On the educational program, Austin Boyer presented a movie on the timber and lumber industries which proved very interesting.

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A-P Valves

AUGMENTING their already complete line of A-P "Dependable" Refrigeration Valves, Automatic Products Company, Milwaukee, Wisconsin, have just announced two new additions to their series of thermostatic expansion valves.

The new valves, models 211 and 212, are designed for use where a pressure limiting feature is desirable to avoid a possible difficulty caused by motor overloading at sharp peak loads or during pull down. Already field-proven, the new valves have demonstrated many advantages over other pressure limiting thermostatic expansion valves.

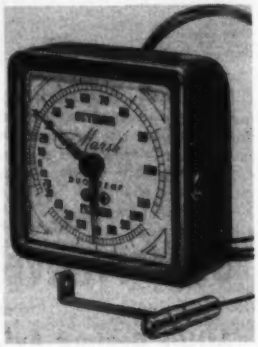
Amazingly simple in construction, A-P models 212 and 211 use only one spring and one needle. A unique and entirely new diaphragm unit limits the operating suction pressure to a predetermined setting. Should the pressure build up to a point approaching overload, this diaphragm actuates the needle pin, allowing the valve needle to move towards the closed position, until the overload condition has passed. Then the valve operates in the normal manner to control superheat through the thermostatic bulb and sensitive large-area diaphragm. Liquid cross charged, Models 211 and 212 retain all the proven superiorities of standard A-P thermostatic expansion valves. They may be mounted in any position or ambient temperature.

The model 211 is non adjustable, but model 212 is adjustable and may be used in place of any standard thermostatic valve of similar capacity. It should be installed on any system offering the remotest possibility of overload, where it will save much service and repair expense and even motor break-down. Types are available to limit pressures to 15, 40 and 55 lbs. Freon 12, and 10 and 30 methyl. Capacities of both models are: ½, 1 and 1½ tons Freon; ½, 1 and 3 tons methyl. Most Refrigeration Equipment Wholesalers will shortly have complete details regarding the new A-P Valves, or information may be obtained from the manufacturer, Automatic Products Company, 2450 North Thirty-Second Street, Milwaukee 10, Wisconsin.

Thermometer

A UNIQUE and highly practical thermometer that registers both indoor and outdoor temperatures is now available. Called the Marsh Duo-Temp Thermometer, this instrument is designed for the home, apartment or private office. It may be placed at any convenient location and is as easy to read as a mantle clock.

The face of the Duo-Temp is divided into two separate temperature ranges. The top range indicates the outdoor temperatures, while the bottom range shows the indoor temperatures. Outdoor temperatures are shown in black and indoor temperatures in red to set off the two temperature scales and to further enhance the attractiveness of the unit.



The Duo-Temp Thermometer is a precision instrument enclosed in a highly finished baked enameled case. Each unit is individually packed in a display box designed for maximum eye appeal and to carry out the accuracy and quality of the product. A retail price of $6.75 has been placed on this item.

The Duo-Temp Thermometer is manufactured by the Jas. P. Marsh Corporation of 2073 Southport Ave., Chicago.

Analyzer

DAVIS Emergency Equipment Co., Inc., manufacturers of gas detection instruments, have introduced their new Micro-Gas Analyzer for determining and analyzing the concentration of gases or vapors in their toxic range.

The analyzer works on the principle of electrical conductivity of solutions. Any gas, therefore, which will ionize in water, with or without heat, may be analyzed in the

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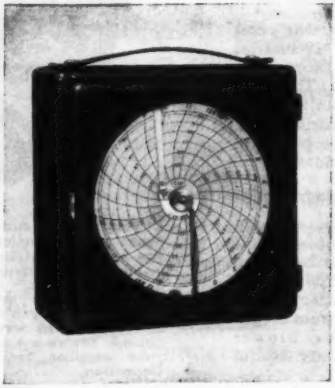
Many different gases may be analyzed by the New Davis Micro-Gas Analyzer. Readings may be made directly and continuously for any of these toxic gases by minor adjustments. By varying the solution flow and the air flow, analyzations may be changed from one gas to another. Included with the instrument is a chart which indicates the flow rate of both water and air for the gas being determined. The analyzer is portable, weighing approximately 33 pounds.

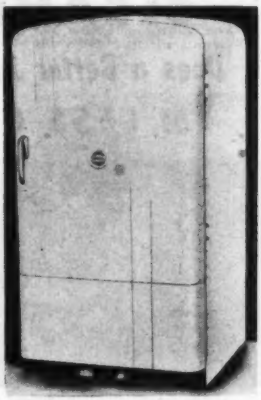
Recorder



A MINIATURE-SIZE temperature recorder, designed for use in the many applications where a shock-resistant, easily portable temperature recording instrument is necessary, has been announced by the C. J. Tagliabue Mfg. Co., Brooklyn, N. Y., a subsidiary of Portable Products Corp. Said to be the only one of its type to resist shock and vibration successfully, this new instrument is particularly suitable for use in trucks, railroad cars and airplanes in transit as well as in other operations where vibration is encountered. Because of its small size and portability, it is also extremely useful for checking refrigerating, heating and air-conditioning equipment. The instrument is available in two forms: the single-pen recording thermometer for recording temperature only, and the two-pen temperature and time-operation recorder, which charts the running time of refrigeration motors in addition to recording temperature. Simplicity of design and construction ensures accuracy in recording. A special transparent, unbreakable plastic front permits full view of entire chart and pen-arm. Pen-arm is "jiggle-proof," and thus temperature record is unaffected by vibration. The instrument is available in models to operate in a wide variety of ranges. Chart drive is a 7-day spring-propelled mechanism with charts of 24 or 72-hour duration. Each recorder is enclosed in an aluminum case.

Wilson Freezer

A NEW front-opening, reach-in home freezer, called the Hi-Boy, which occupies less than a square yard of floor space but stores 220 pounds of assorted frozen foods based on 35 pounds per



cubic foot, is being introduced by Wilson Refrigeration, Inc. A. A. Davis, vice president and general sales manager, reported the new product to be as simple to use as a household refrigerator, with no lids to lift nor excess chilling of the hands when removing food packages. The streamlined Hi-Boy features, among other things, a removable front, allowing the freezer to be moved easily through the narrowest doors.

The Hi-Boy has been designed to meet the exacting requirements of urban families who are seeking a freezer with functional beauty, modern economy and convenience advantages. Its reach-in design permits ready and easy access to all food packages without stooping or bending.

The Hi-Boy does not need defrosting as often, or in the manner of the domestic refrigerator and it is not necessary to shut-off the power during the defrosting process.

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FOR industrial school and home workshop use, a completely equipped sheet metal working shop mounted on a heavy gauge steel stand nearly 6 feet in length is now being produced by Berkroy

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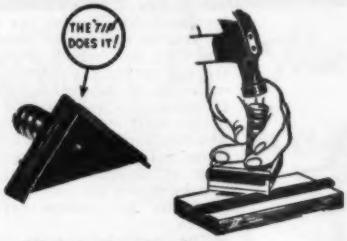

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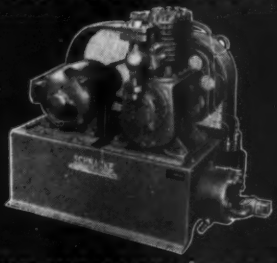

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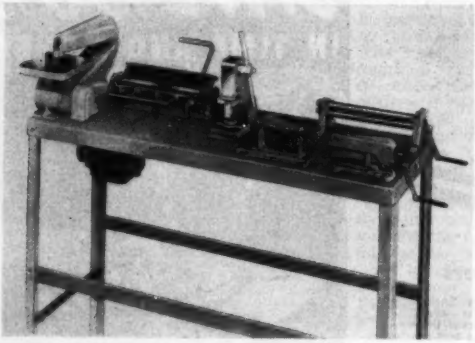
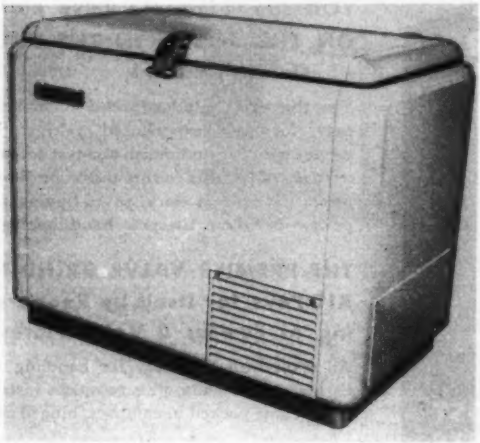


plastics and other softer materials can be worked. The complete unit includes five tools, Nibbler, 12" Slip Roll, Hand Punch, 12" Brake and Shear.

Priced at only $217.50, the Berkroy Unit is the first complete metal working equipment within range of modest small work, the tools are comparable to larger equipment and much more economical. Because of this fact, they have wide applications in industry both in metal working shops and experimental departments. The Berkroy Unit is also well adapted to use in schools.

Ben-Hur Freezer



THE Ben-Hur Mfg. Company, Milwaukee, builders of the "BEN-HUR" Farm & Home Freezer, announces a new, more compact model that is described by the designers as a triumph in modern freezer engineering. Incorporating many new and advanced features of convenience, utility, and economy, the new "Ben-Hur" Model 197 provides some powerful advantages in home freezer.

One of the characteristics of the new model is its additional food storage capacity without any increase in freezer dimensions. Planned for the urban family's requirements, it offers definitely increased dollar value per cubic foot as a result of providing nine cubic feet of food storage within the overall dimensions of the average 6 cu. ft. cabinet—a gain of 50% in usable food storage capacity. The new unit is built with the same extra thick all-around wall of fibreglass insulation and increases the market opportunity for dealers everywhere.

The new horizontal condenser unit, eliminates waste space while providing greater compactness and operating efficiency. The shape of the cabinet is designed to fit into the limited floor area available in the average size home for installing a freezer unit. Other features include the "slamless" cover, sturdy welded steel cabinet construction, insulation hermetically sealed against moisture, heavily plated "Safety" Hardware, extra thick insulation, hermetic freezer unit, flat tabletop, table height, and gleaming white baked-on enamel finish. The dimensions of the cabinet are 28½" wide, 36" high, and 48" long.

Service Bar

COMPLETE, compact, convenient are the words used to describe the new RAM-co Service Bar.

Big feature of the unit is the new Hudson 3-Way Pressure Drink Dispenser. This provides two popular flavors, such as cola and ginger ale, plus sparkling soda, all from the same dispensing faucet. A simple touch of the faucet handle in one of three directions dispenses any two desired flavors plus plain soda, properly cooled, perfectly carbonated and mixed in just the right proportions for a tasty drink or chaser. Syrups are contained in two stainless steel tanks which are placed at any convenient point. Syrup is driven to faucet by pressure.

The service bar is constructed of stainless steel in a beautiful sunburst design. Though complete in every detail, requiring only to be attached to water line and drain, the RAM-co Service Bar is compact.

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News of the Equipment Industry

DESIGN TREND SEEN IN NEW METAL TRIM

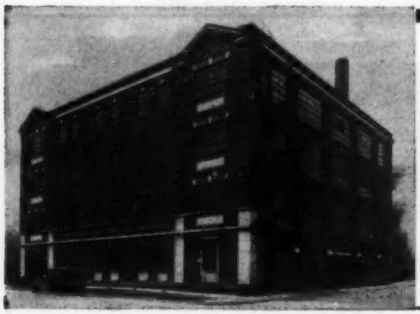
A RECENT change in the new Frostair refrigerator typifies a cabinet and trim design trend which is growing in the industry. This recent alteration is the change to stainless Rigidized Metal cold-ban facing for the door recess in the cabinet front. The adoption of stainless Rigidized Metal for such functional trim was led some months ago by Kelvinator and Leonard on home freezer units and is being followed by a number of refrigeration designers and manufacturers.

The economics behind adoption of the material are regulated by two factors. The first is a quality eye-appeal which is helpful in merchandising "deluxe" models, and second, a genuine utility value which facilitates cabinet manufacture and improves service life.

From the appearance standpoint the Rigidized Metal offers a luxurious-looking surface made up of hundreds of tiny facets which gives the appearance of a woven texture and creates an illusion of depth and richness.

In addition to strict first impression appearance, the Rigidized Metal trim also offers some additional selling points which are going to become much more important as the buyers' market in refrigerators declines. Being stainless, the Rigidized Metal wipes clean and shining with a rub of a damp-dry cloth and its textured surface admirably conceals fingermarks, scratches or accidental dents which may occur in service.

There has been no objection on the part of manufacturers to adoption of Rigidized Metal since its cost lines up well with competitive materials, and because it fabricates in the same manner as ordinary stainless steel. The new trend in cabinet design has not made a wide appearance as yet since many applications of Rigidized Metal are



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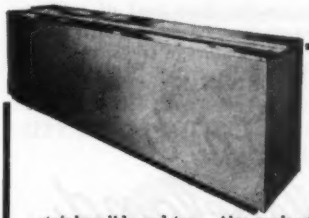

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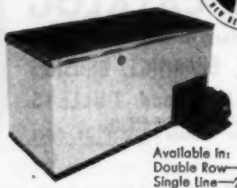

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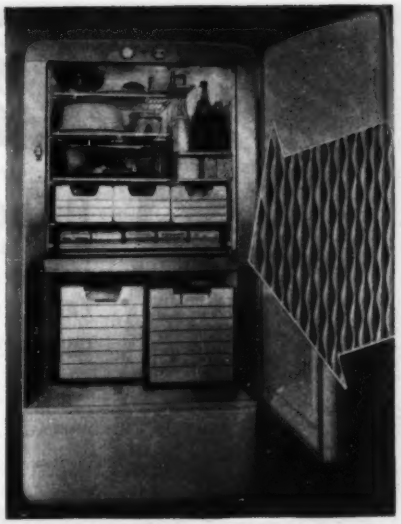

New Metal Trim on the Frostaire

still on the designers' boards or in the mock-up stage for new models. Some of the changes you may see during '48 will include hydrator pans, freezer compartment doors, scuff plates on the floor level of cabinets, finger plates on door hardware, shelf guides and trim, ice cube storage trays, etc.

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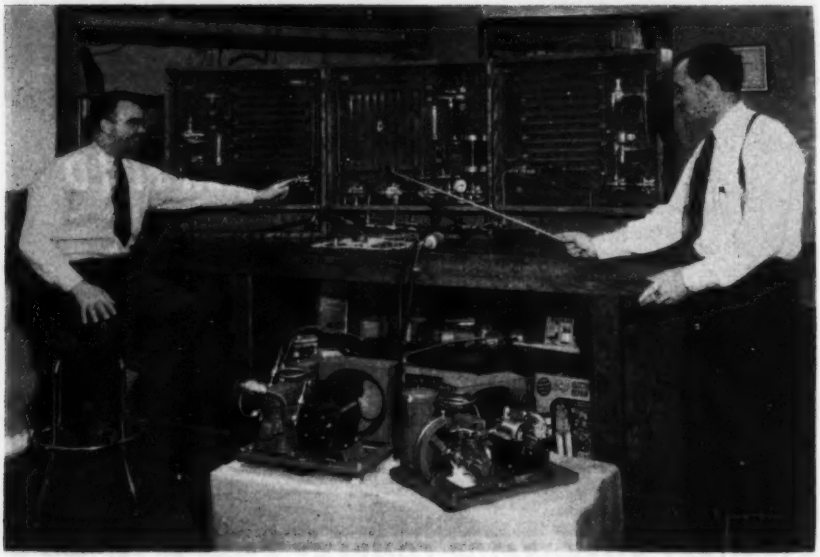

The portable demonstration unit being used by Jack & Heintz Service Engineers to demonstrate condensing units and controls. Jack Clarke (left) and John S. Mackinlay demonstrate the unit at F. H. Langsenkamp Company, Indianapolis, Ind., October 16, the second of a series of seven wholesaler-dealer meetings currently being conducted by Jack & Heintz.

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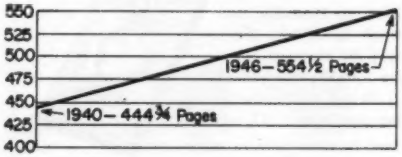

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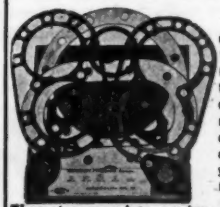

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SPORLAN VALVE IN NEW BUILDING

THE Sporlan Valve Company will be located in a new Sporlan Building, at 7525 Sussex Avenue, St. Louis 17, Missouri, after October 6, 1947.

The new Sporlan Building will contain the Executive and General Offices and the Shipping and Repair Departments.

DENNIS OF OMAHA CONSTRUCTING NEW BUILDING

THE Dennis Refrigeration Supply Company is constructing a $40,000 building at Park Ave. and Douglas St., Omaha, Neb., which will contain the newest type year-around air conditioning system. The one-story structure will be part reinforced concrete and part brick and stone facing, and is scheduled to be completed about March 1.

In the upper picture members of the show committee are discussing the Fifth All-Industry Refrigeration and Air Conditioning Exposition to be held in the Cleveland Public Auditorium, January 26-29, 1948. Shown at a recent meeting in Cleveland are (left to right) J. A. Strachan, Cleveland, F. J. Hood, Marinette, Wis., and R. K. Hanson, Pittsburgh, show director and executive secretary of the Refrigeration Equipment Manufacturers Association which is sponsoring the show. In the lower picture E. M. Flannery (left), newly-elected president of Rema, and Earl A. Vallee, a past president and member of the advisory board, talk over plans for the show.

FOY ELECTED PRESIDENT OF JACK AND HEINTZ INDUSTRIES

AT ITS monthly meeting, held October 16 in New York City, the Board of Directors of Jack & Heintz Precision Industries, Inc., Cleveland, Ohio, elected Byron C. Foy, Chairman of the Board, President of the Company.

William S. Jack, former President, was not a candidate for re-election at the Annual Meeting of Stockholders in May, 1947, when Directors for the year were elected.

Mr. Foy, who will continue to serve as Chairman of the Board, announced at the meeting that the employment contract between Mr. Jack and the Company had recently been cancelled by mutual consent.

R. L. HINSHAW RESIGNS

R. L. HINSHAW, Director and Secretary of the Refrigeration Equipment Wholesalers Association has resigned and with much regret, members of the association have voted to accept the resignation. Mr. Hinshaw explained that business conditions made it necessary that he resign.

Director I. J. Fajans has been approved by the board of directors as the new secretary to fill the remainder of the term.

E. FLEX OF BORG-WARNER SUBSIDIARY REPORTS ON BRITISH INDUSTRY

THE black shadow of a coal shortage darkens the British manufacturing scene as winter approaches.

Widespread industrial shutdowns in the event of prolonged severe weather in the United Kingdom were predicted by Edward Flex, Managing Director of the Morse Chain Co., Ltd., an English subsidiary of the Borg-Warner Corp. of Chicago.

Mr. Flex pointed out that a growing scarcity of coal not only is throttling domestic production in Britain but also is choking his country's trade with Western Europe. In return for the 30 to 40 million tons of coal which Britain exported to the continent before the war, she used to receive food, lumber, hides, iron ore and other sorely needed items. These imports virtually have been shut off.

The industrialists believes the increasing mechanization of British mines will relieve though not entirely offset the coal shortage.

He also blamed the scarcity of labor, materials and dollars, and uncertainty over the

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Labor government's future policies toward industry, for Britain's economic plight.

Mr. Flex is visiting the plants of the Morse Chain Co. in Detroit and Ithaca, N. Y., and the executive offices of their parent corporation, Borg-Warner, in Chicago. He is accompanied by N. A. Mostyn, Director and Secretary of Morse Chain Co., Ltd., whose plant is in Letchworth, England.

\$ \$ \$

PARR IS NEW FIELD SUPERVISOR FOR SERVEL

T. E. PARR

ACCORDING to a report from Walter P. Wood, Publicity Manager, T. E. Parr has recently been named Field Service Supervisor for the Electric Refrigeration Division of Servel, Inc. Mr. Parr was associated with Servel previously from 1926 until 1934. During the war he was an engineer with the Kaiser organization. Mr. Parr's headquarters will be in Evansville.

\$ \$ \$

G.E. PROMOTES L. H. MATTHES

L. H. MATTHES has been appointed Manager of Marketing for General Electric's Air Conditioning Department with headquarters at Bloomfield, N. J., G. R. Prout, vice president and general manager of the Department, has announced.

L. H. MATTHES

Mr. Matthes, who will be responsible to the vice president directly, will supervise all advertising and sales promotion, marketing services, and commercial engineering and sales for the G. E. department.

Graduating from the G. E. test engineering course in 1922, Mr. Matthes spent two years as a design engineer before becoming a sales engineer in the Company's West Virginia office. In 1928 he was made manager

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of the Apparatus Department office in Beaumont, Texas.

Prior to his present appointment Mr. Matthes was District Manager for Apparatus products in the Texas area.

\$ \$ \$

WOLVERINE OPENS WAREHOUSE

WOLVERINE Tube Division, Detroit, opened a new warehouse recently at 1515 Fulton Street, Houston, Texas. L. G. Fox, Southwestern Sales Representative for the company, will supervise the operation of the warehouse which will stock Wolverine seamless non-ferrous tube in the form of condenser tubes, S.P.S. pipe, copper water tube and refrigeration tube.

L. G. FOX

Following its official opening on October 25, the Wolverine warehouse (the first, post-war) will be completely equipped to serve the southwestern territory.

\$ \$ \$

KEROTEST APPOINTS NEW SOUTHWEST REPRESENTATIVE

LEO J. FREITAS was recently appointed Southwest sales representative for refrigeration valves and fittings manufactured by Kerotest Manufacturing Company, Pittsburgh, according to an announcement by G. R. Allen, General Sales Manager of Kerotest. Mr. Freitas, whose headquarters will be in Dallas, will handle the complete line of Kerotest refrigeration valves, fittings and accessories.

L. J. FREITAS

Mr. Freitas served for many years as an experimental engineer in Detroit and as Dallas branch manager for Fedders Manufacturing Co. During the war he was assistant director of the WPB Refrigeration Branch. Since 1941 he has been acting as a representative for a number of firms serving the refrigeration industry.

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NEW LIQUID PACIFIC DIVISION

THE Liquid Carbonic Corporation, Chicago, has announced, effective October 1, that all Liquid operations on the Pacific Coast will follow the pattern of the corporation's operations throughout the rest of the United States under the newly formed Pacific Division of the Liquid corporation.

The Liquid Carbonic Pacific Corporation, which had its headquarters in Los Angeles, was dissolved during September.

Sales offices, depots and warehouses will continue to operate as in the past.

H. C. Mathey has been appointed General Manager of the new division and will have his offices in Los Angeles at the address of the former Pacific Corporation. The sales of bottling machinery, extracts, carbonic gas and dry ice will be handled at two branch headquarters. R. M. Moye is the Branch Manager at Los Angeles, and J. C. Fulton is Branch Manager at Seattle.

Fountain and Ice Cream Cabinet sales and service are under Robert W. Mann, as Pacific Regional Manager, with headquarters in San Francisco. He will be assisted by M. E. Berger as Southern California Fountain Sales Manager with headquarters in Los Angeles.

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, and March 3, 1933, of THE REFRIGERATION SERVICE ENGINEER, published monthly at 435 North Waller Ave., Chicago 44, Ill., for October, 1947.

State of Illinois, Cook County, ss: Before me a Notary Public in and for the State and county aforesaid, personally appeared H. T. McDermott, who, having been duly sworn according to law, deposes and says that he is the Editor and Publisher of THE REFRIGERATION SERVICE ENGINEER, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, and March 3, 1933, embodied in section 433, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Nickerson & Collins Company, Chicago, Ill.; Editor, H. T. McDermott, Oak Park, Ill.; Managing Editor, H. D. Busby, River Grove, Ill.; Business Manager, L. R. Townsley, Chicago, Ill.

2. That the owners are: Nickerson & Collins Co., Chicago, Ill.; H. T. McDermott, Oak Park, Ill.; H. T. Curtis, Chicago, Ill.; L. R. Townsley, Chicago, Ill.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: There are no bondholders, mortgagees, or other security holders.

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(Signed) H. T. McDERMOTT,
Editor and Publisher.

Sworn to and subscribed before me this 19th day of September, 1947. Helen G. Smith, notary public. [Seal.] (My commission expires June 21, 1948.)

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NOVEMBER *Index to Advertisers* 1947

Ace Cabinet Co. 9f
Acme Products Co. 112
Aerovox Corp. 91
Airco Refrigeration Parts 105
Airo Supply Co., Inc. 103
Alco Valve Co. 5
Alter Co., The Harry 107
Ansul Chemical Co. 1
Automatic Heating & Cooling Supply Co. 105
Automatic Products Co. ..... 56 and 57

Bacharach Industrial Instrument Co. 4
Bake Engineering Co. 109
Barksdale Compressor Service 108
Ben Hur Mfg. Co. 85
Berdor Electric Co. 112
Betz Corp. 8
Black, Sivalls & Bryson, Inc. 89
Blythe Co., H. W. 107
Brunner Manufacturing Co. 21
Bush Manufacturing Co. 23

Chase Refrigeration Supply Co. 107
Chicago Seal Co. ..... Inside Front Cover
Chicago-Wilcox Manufacturing Co. 101
Commercial Trades Institute ..... 96 and 102
Conservative Gas Corporation (Modern Gas Division) 89
Cutler-Hammer, Inc. 77

Davison Chemical Corp. ..... Inside Back Cover
Day & Night Mfg. Co. (Refrigeration Div.) 85
Detroit Air Conditioning Institute 101
Detroit Lubricator Co. ..... 2 and 3
Detroit Sealed-In Parts Co. 110
Du Pont de Nemours & Co., E. I. (Electrochemical Dept.) 10

Ebco Manufacturing Co., The 87
Edison Cooling Corp. 108
Electrimatic 81
Exchange Mart 110

Fine Products Co. 101

G & E Equipment Supply Co. 107
General Controls 101

Harco Equipment Co. 97
Hasco, Inc. 104
Henry Valve Co. 12
Highside Chemicals Co. 14

Ideal Industries, Inc. 91
Imperial Brass Mfg. Co. 11

Jack & Heintz Precision Industries, Inc. 28
Jamison Cold Storage Door Co. 13
Jarrow Products 93

Kelvinator (Div. of Nash Kelvinator Corp.) 61
Keystone Engineernig Corp. 109
Kold-Hold Manufacturing Co. 16
Kramer Co., Fred C. 106
Kramer-Trenton Co. 75

Lehigh Manufacturing Co. 79
Lynch Manufacturing Corp. 15

Marsh Corporation, Jas. P. 67
McIntire Connector Co. 22
Mechanical Enterprises 87
Mills Industries, Incorporated 17
Minerallac Electric Co. 99
Mueller Brass Co. 18

Peerless of America, Inc. 19
Penguin Products 106
Penn Electric Switch Co. 20
Premier Co., The 93

Ranco, Inc. 24
Refrigeration Control Service 109
Refrigeration Maintenance Corp. 110
Refrigeration Service, Inc. 104
Rempe Co. 95
Republic Electric Co. 106

Sanitary Refrigerator Co. 99
Schnacke, Inc. 93
Sealed Unit Parts Co. 109
Servel, Inc. 96
Service Parts Co. 103
Shank Co., Cyrus 99
Shawnee Products, Inc. 97
Skasol Corp. 7
South Bend Lathe Works 73
Sporlan Valve Co. 26
Standard Refrigeration Co. 59
Superior Valve and Fittings Co. 71
Supreme Mfg. Co. 108

Temprite Products Corp. 69
Thermal Co., Inc. 107
Tinit Manufacturing Co., Inc. 97
Tudor Chemical Specialties, Inc. 102

United Speedometer Repair Co. 109
Universal Cooler Div. 65
Utilities Engineering Institute 95
Utility Thermostat Co. 108

Virginia Smelting Co. 63

Wagner Electric Corp. 9
Wagner Tool & Supply Corp. 6
White-Rodgers Electric Co. ..... Back Cover
Wholesale Refrigeration Repair Co. 110

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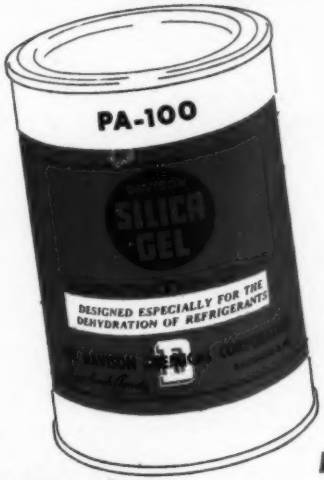

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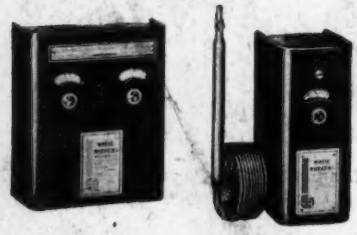

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